

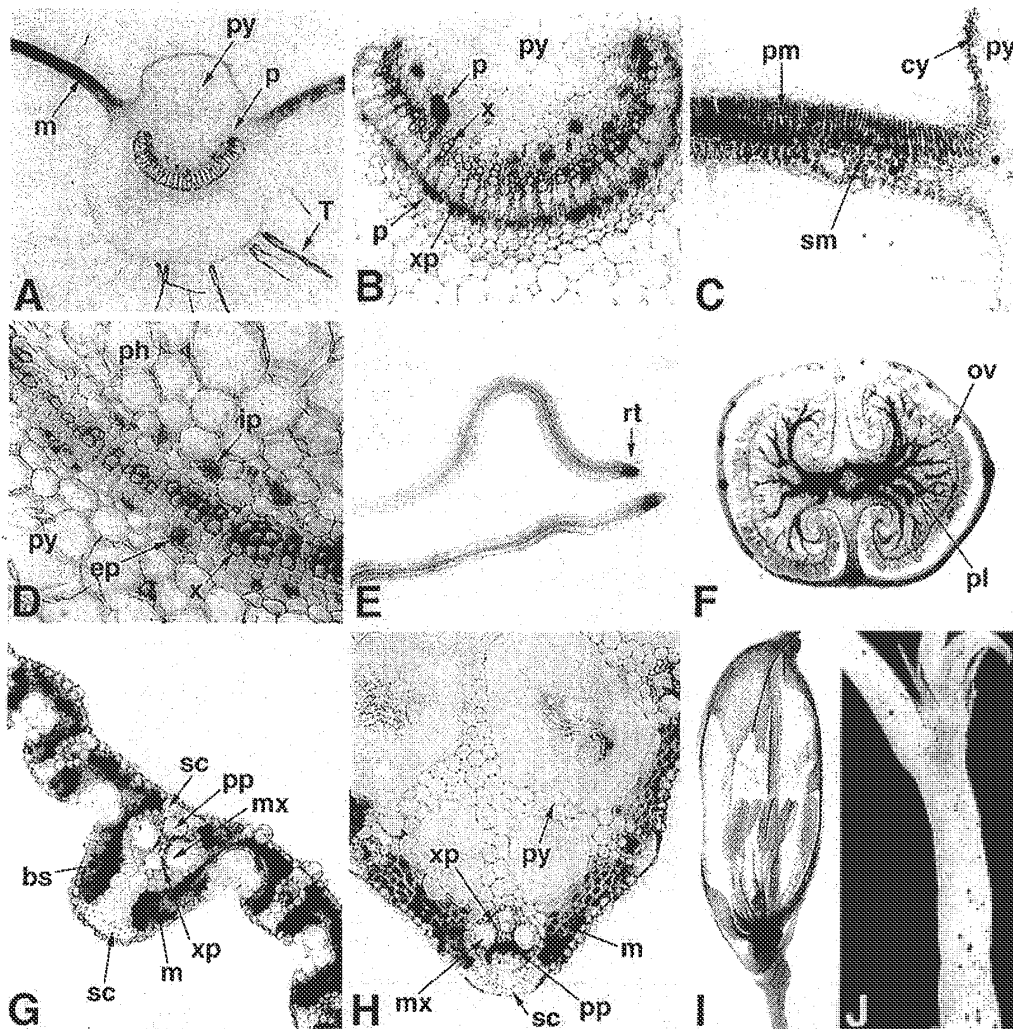


Figure 6. Histochemical localization of GUS expression in transgenic tobacco and rice plants containing CVMV promoter-uidA gene fusion. GUS activity is indicated in the transgenic tissues by an indigo dye precipitate after staining with X-Gluc. Pictures presented are from CVP2:uidA transgenic plants. A. Tobacco leaf section. B. Detail of tobacco leaf section showing vascular tissues of the midrib ($\times 10$). C. Transverse section through tobacco leaf lamina ($\times 30$). D. Vascular tissues in tobacco stem cross-section ($\times 30$). E. Tobacco roots ($\times 10$). F. Transverse section through tobacco ovary ($\times 10$). G. Rice leaf cross-section ($\times 50$). H. Cross-section of a rice leaf sheath ($\times 50$). I. Rice flower split axially and subsequently stained for GUS activity ($\times 10$). J. GUS transient expression on cassava stem from *in vitro* plantlet ($\times 5$). bs, bundle sheath; cy, chlorenchyma; ep, external phloem; ip, internal phloem; m, mesophyll; mx, metaxylem; ov, ovule; p, phloem; ph, phloem; pl, placenta; pm, palisade mesophyll; pp, phloem parenchyma; py, parenchyma; rt, root tip; sc, sclerenchyma; sm, spongy mesophyll; x, xylem; xp, xylem parenchyma.

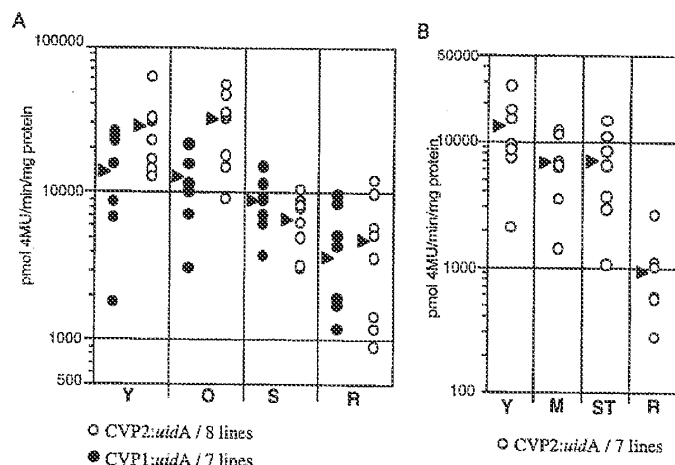


Figure 7. Distribution of GUS activity in different tissues among tobacco (A) and rice (B) transgenic lines. Specific GUS activity is given as picomoles of 4 methylumbelliferone per milligram of protein per minute. Transgenic tobacco lines containing either CVP1 (solid dots) or CVP2 (open dots) *uidA* fusion gene were tested for GUS activity in young leaves (Y / 3 to 5 cm in length), mature leaves (M / 10 cm and up in length), stems (S), and roots (R). Transgenic rice lines tested contained only the CVP2 construct. Samples for protein extraction were taken from mature (5 to 7 weeks old) R1 transgenic tobacco plants grown in a greenhouse. Rice plants used in this study were R0 transformants (2 months old) grown in a greenhouse. In rice, ST refers to leaf sheath explants. Distribution of GUS activity was plotted and is shown for tobacco (panel A) and rice (panel B) plants. Each dot represents a single independent transgenic line. Number of lines tested is mentioned on the figure. Mean level of GUS activity in the different organs and for each construct is indicated by a solid arrow. Logarithmic scale was used to accommodate large variation between lines.

ment CVP1 is approximately two-fold less active than the longer CVP2 fragment. However, both fragments result in the same pattern of expression in transgenic tobacco and plants. Differences in the level of expression observed in protoplasts could be due to a transcriptional enhancer in the 5' region of the larger fragment or to the larger untranslated leader sequence. The latter could be important for greater message stability or translation efficiency. The first 60 nucleotides of the CaMV leader (from +1 to the first ATG) stimulate expression of a downstream gene by about 2-fold [14, 17]. Similar effect has been reported for the untranslated leader of the rice tungro bacilliform virus promoter [11]. However there is limited sequence homology between the CVMV leader and those of the CaMV or RTBV leaders. Analysis of transgenic plants indicate that the CVMV promoter, as is the case with other caulimovirus promoters, is active in all organs, in various cell types and is not dependent on viral trans-acting factors. The CVMV promoter is strongly expressed in vascular tissues, in leaf mesophyll cells, and in the root tips of rice and tobacco plants. However, GUS activity was non detectable in non-chlorophyllaceous cells of tobacco pith and cortical parenchyma. This

could indicate that the CVMV promoter has two major domains of activity, i.e., the vascular elements and the green, chloroplast-containing cells. Analysis of CaMV 35S-*uidA* gene expression in transgenic tobacco and rice plants (not shown) confirmed previous reports [3, 24, 49] and also showed more staining in chlorophyllaceous cells than in cortical parenchyma cells. However, we cannot exclude the possibility that these observations are due to the limitations of the staining assay. Large cells with little cytoplasm (such as parenchyma cells) may appear to contain little or no stain compared with smaller cells with dense cytoplasm. Likewise, cells with different metabolic activities may stain with different intensities.

This study has shown that expression of the CVMV promoter in protoplasts and transgenic plants is relatively similar to that of the 35S promoter. However, the nucleotide sequence of the CVMV promoter has limited homologies with other caulimovirus promoters which may imply differences in the mechanisms of regulation of the promoter. Analysis of the CVMV promoter sequence shows the presence of several motifs that resemble previously identified *cis* elements that are implicated in transcriptional regulation. The pres-

ence of such motifs in the CVMV promoter could explain the pattern of expression in transgenic plants. A 16 bp motif with strong homology with the activation sequence 1 (as1) of the CaMV 35S promoter [29] was identified in the CVMV promoter at nt -203 to -219. This motif is also found in the FMV promoter [46]. A less conserved motif has also been identified in the CoYMV badnavirus promoter [34]. The as1 element, characterized by TGACG direct repeats, binds to the AS1 nuclear factor [16] as well as the cloned TGA1 transcription factor [25]. This motif, in the CaMV 35S promoter, is able to confer expression principally in root tissues [4], but it also plays a more complex role in the regulation of the promoter by interacting synergistically with other *cis*-elements [15, 29]. However, in the CVMV promoter, this as1 motif is located at position -203 to -219 while in the caulimovirus promoters, it is generally closer to the TATA box (-83 to -63 in the 35S CaMV promoter; -57 to -73 in the FMV promoter).

At position -90 to -111 we identified a 22 nucleotide sequence CTTATCACAAGGAATCTTA TC that is present at the same relative position (-78 to -100) in the CoYMV promoter but not in other plant pararetrovirus promoters. This motif is located in the CoYMV promoter in a region required for expression in vascular tissues [35]. The CVMV promoter also includes the motif AAGATAAGG (-186 to -194) which contains the boxI consensus GATAAG that is present in *rbcS* gene promoters [13]. In addition, the sequence GTAGAAA, identified at position -257 to -263, is identical to the binding site sequence for the MNF1 leaf-specific nuclear factor, found in the PEPc gene promoter as well as in the 35S promoter [50]. These motifs could be involved in the strong gene expression of the CVMV promoters in mesophyll cells. Nucleotides -170 to -130 (Fig. 2) contain two motifs that are similar to the SV 40 enhancer core sequence GTGGAAAG [38]. The relative importance and the biological role of all these motifs in this promoter are being evaluated.

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12/091,896	11/03/2008	1616	1270	DAS-PO129-US-02	15	2

CONFIRMATION NO. 6428

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Title

Novel Herbicide Resistance Genes

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504

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FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	330			
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	100			
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	220			
TOTAL CLAIMS (37 CFR 1.16(i))	15	minus 20 = *				x 52 =	0.00			
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APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
					TOTAL ADD'L FEE				TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
					TOTAL ADD'L FEE				TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										



UNITED STATES PATENT AND TRADEMARK OFFICE

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www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
12/091,896	Terry R. Wright	DAS-PO129-US-02
83067		
Baker & Daniels LLP- Dow AgroSciences		
300 North Meridian Street, Suite 2700		
Indianapolis, IN 46204		
INTERNATIONAL APPLICATION NO.		
PCT/US06/42133		
I.A. FILING DATE	PRIORITY DATE	
10/27/2006	10/28/2005	

CONFIRMATION NO. 6428
371 ACCEPTANCE LETTER



Date Mailed: 05/12/2011

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated / Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

11/03/2008	11/03/2008
DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS	DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363). Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- Copy of the International Application filed on 04/28/2008
- Copy of the International Search Report filed on 09/12/2008
- Copy of IPE Report filed on 08/23/2009
- Preliminary Amendments filed on 04/28/2008
- Information Disclosure Statements filed on 07/20/2010
- Biochemical Sequence Diskette filed on 04/28/2008
- Oath or Declaration filed on 11/03/2008
- Biochemical Sequence Listing filed on 04/28/2008
- U.S. Basic National Fees filed on 04/28/2008
- Priority Documents filed on 04/28/2008
- Power of Attorney filed on 01/27/2009
- Specification filed on 04/28/2008
- Claims filed on 04/28/2008
- Abstracts filed on 04/28/2008
- Drawings filed on 04/28/2008
- Paper nucleotide sequence listings filed on 04/28/2008

page 1 of 2

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

RODERICK M JONES

Telephone: (571) 272-9083

page 2 of 2

FORM PCT/DO/EO/903 (371 Acceptance Notice)

To: inteias@bakerd.com,cynthia.payson@bakerd.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 83067

May 12, 2011 05:29:16 AM

Dear PAIR Customer:

Baker & Daniels LLP- Dow AgroSciences
300 North Meridian Street, Suite 2700
Indianapolis, IN 46204
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 83067 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:

The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
12091896	APP.FILE.REC	05/12/2011	DAS-PO129-US-02
	M903	05/12/2011	DAS-PO129-US-02

To view your correspondence online or update your email addresses, please visit us anytime at <https://sportal.uspto.gov/secure/myportal/privatepair>.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

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Thank you for prompt attention to this notice,

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/091,896	11/03/2008	Terry R. Wright	DAS-PO129-US-02	6428
83067	7590	07/14/2011		
Baker & Daniels LLP- Dow AgroSciences 300 North Meridian Street, Suite 2700 Indianapolis, IN 46204			EXAMINER KRUSE, DAVID H	
			ART UNIT 1638	PAPER NUMBER
			NOTIFICATION DATE 07/14/2011	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

intcas@bakerd.com
cynthia.payson@bakerd.com

Office Action Summary	Application No.	Applicant(s)
	12/091,896	WRIGHT ET AL.
	Examiner	Art Unit
	DAVID H. KRUSE	1638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on ____.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 89-103 is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5) ☐ Claim(s) ____ is/are allowed.

6) ☒ Claim(s) 89-103 is/are rejected.

7) ☐ Claim(s) ____ is/are objected to.

8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on 28 April 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s) 1) ☒ Notice of References Cited (PTO-892) 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>7/20/2010</u>	4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____. 5) ☐ Notice of Informal Patent Application 6) ☐ Other: _____.
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DETAILED ACTION

Information Disclosure Statement

1. The listing of references on pages 135-142 of the specification is not a proper information disclosure statement. 37 CFR § 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Specification

2. The disclosure is objected to because of the following informalities:

On page 106 there is a Table that lacks a table number, subsequent Tables would need to be renumbered and the specification amended to reflect the renumbering of Tables.

At pages 108-109, paragraph 00361, there appear to be nucleotide sequences not in the Sequence Listing. This paragraph refers to sequence numbers found in a PCT application. If the recited nucleotide sequences are not found in the instant Sequence Listing, Applicants are required to place the instant application in compliance with the Sequence Rules. Failure to correct this issue will be held as non-responsive to this Office action.

Appropriate correction is required.

Claim Objections

3. The claims are objected to because of the following informalities: Specifically in the Claims amendment filed on 28 April 2008, the listing of claims should indicate -- 1-88 (cancelled) --; in addition none of the newly presented claims have a status identifier. Any response to this Office action must present the claims in compliance with 37 CFR § 1.121(c). Failure to correct this issue will be held as non-responsive to this Office action. Appropriate correction is required.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. § 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claim 103 is rejected under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter. The claim reads on a product of nature, the recitation of structural and functional characteristics does not specifically denote the hand of man in the instantly claimed invention. A DNA sequence is not patentable because a sequence is merely descriptive information about a molecule. Amending the claim to read -- An isolated polynucleotide -- would obviate this rejection.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. § 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 89-103 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter

which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants claim a polynucleotide encoding an aryloxyalkanoate dioxygenase enzyme that hybridizes under stringent conditions comprising 0.2x SSPE at 65°C to the full complement of instant SEQ ID NO: 1, 3 or 5. Applicants claim a plant cell comprising said polynucleotide. Applicants claim a plant cell wherein the enzyme has at least 85% sequence identity with SEQ ID NO: 2 or SEQ ID NO: 4.

Applicants describe isolated polynucleotides that encode an aryloxyalkanoate dioxygenase enzyme having the amino acid sequence of SEQ ID NO: 2 or SEQ ID NO: 4 (which are 99.7% identical to each other). Applicants describe three polynucleotides that encode instant SEQ ID NO: 2; SEQ ID NO: 1 being a native coding sequence and SEQ ID NO: 3 and 5 being codon optimized coding sequences. SEQ ID NO: 1 is 74.5% identical to SEQ ID NO: 5 and 67.9% identical to SEQ ID NO: 3.

Applicants do not describe the broad genus of polynucleotides encoding an aryloxyalkanoate dioxygenase enzyme that hybridizes under stringent conditions comprising 0.2x SSPE at 65°C to the full complement of instant SEQ ID NO: 1, 3 or 5, or that encode said enzyme wherein the enzyme has at least 85% sequence identity with SEQ ID NO: 2 or SEQ ID NO: 4.

Hence, it is unclear that Applicants were in possession of the invention as broadly claimed. See *Ex parte Kubin*, 83 USPQ2d 1410 (Bd. Pat. App. & Int. 2007) at pg 1417:

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[Appellants] ... have not described what domains of those sequences are correlated with the required binding to CD48, and thus have not described which of NAIL's amino acids can be varied and still maintain binding. Thus, under Lilly and its progeny, their Specification would not have shown possession of a sufficient number of sequences falling within their potentially large genus to establish possession of their claimed genus. Cf. *Enzo*, 323 F.3d at 964, 63 USPQ2d at 1612 ("if the functional characteristic of ... binding to [CD48] were coupled with a disclosed correlation between that function and a structure that is sufficiently known or disclosed," the written description requirement may be met).

Without a correlation between structure and function, the claim does little more than define the claimed invention by function. That is not sufficient to satisfy the written description requirement. See *Eli Lilly*, 119 F.3d at 1568, 43 USPQ2d at 1406 ("definition by function ... does not suffice to define the genus because it is only an indication of what the gene does, rather than what it is").

With respect to Appellants' reliance on hypothetical Example 14 in the Office's Synopsis, "[c]ompliance with the written description requirement is essentially a fact-based inquiry that will 'necessarily vary depending on the nature of the invention claimed.'" *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991) (quoting *In re DiLeone*, 436 F.2d 1404, 1405, 168 USPQ 592, 593 (CCPA 1971)), quoted with approval in *Enzo*, 323 F.3d at 963, 63 USPQ2d at 1612. While the Written Description Guidelines and the hypothetical examples in the Office's *Synopsis* can be helpful in understanding how to apply the relevant law (as it existed in 2001 when the Guidelines were adopted), they do not create a rigid test.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claim 103 is rejected under 35 U.S.C. § 102(b) as being anticipated by Schleinitz *et al* (September 2004, *Applied and Environmental Microbiology* 70(9): 5357-5365).

Schleinitz *et al* disclose an isolated polynucleotide comprising instant SEQ ID NO: 1 at GenBank accession number AY327575 (page 5359, right column, 5th paragraph). The encoded protein (see FIG 2 on page 5360) would inherently have

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aryloxyalkanoate dioxygenase activity. Hence, the claim limitation had been previously disclosed.

10. Claims 89-94 and 103 are rejected under 35 U.S.C. 102(b) as being anticipated by Kaphammer (U.S. Patent 5,608,147) taken with the evidence of Fourgoux-Nicol *et al* (1999, Plant Molecular Biology 40: 857-872).

Kaphammer discloses a plant cell comprising a polynucleotide that encodes a protein having aryloxyalkanoate dioxygenase activity, resistance to 2,4-dichlorophenoxyacetate (2,4-D) at claim 11, and a plant regenerated therefrom at claim 15. Kaphammer discloses an isolated polynucleotide that encodes a protein having aryloxyalkanoate dioxygenase activity at SEQ ID NO: 1.

Fourgoux-Nicol *et al* (1999, Plant Molecular Biology 40 :857-872) teach the isolation of a 674bp fragment using a 497bp probe incorporating stringent hybridization conditions comprising three consecutive 30 minute rinses in 2X, 1X and 0.1X SSC with 0.1% SDS at 65°C (page 859, left column, 2nd paragraph). Fourgoux-Nicol *et al* also teach that the probe and isolated DNA fragment exhibited a number of sequence differences comprising a 99bp insertion within the probe and a single nucleotide gap, while the DNA fragment contained 2 single nucleotide gaps and together the fragments contained 27 nucleotide mismatches. Taking into account the insertions, gaps and mismatches, the longest stretch of contiguous nucleotides to which the probe could hybridize consisted of 93bp of DNA (page 862, Figure 2). In the present example, the isolated fragment exhibits less than 50% sequence identity with the probe.

Without evidence to the contrary, the polynucleotide disclosed by Kaphammer would hybridize to instant SEQ ID NO: 1 or 3, for example, under stringent conditions comprising 0.2X SSPE at 65°C.

Kaphammer discloses transforming a soybean cell at Example 11, columns 21-22. Kaphammer discloses a method of controlling weeds by applying 2,4-D herbicide to a crop field at column 2, lines 26-28. Hence, Kaphammer had previously disclosed the claim limitations.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 89-102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaphammer (U.S. Patent 5,608,147) in view of Schleinitz *et al* (September 2004, Applied and Environmental Microbiology 70(9): 5357-5365) and Pallett *et al* (U.S. Patent 7,205,561 B1, § 371(c)(1) date of 15 June 1998).

Kaphammer teaches a plant cell comprising a polynucleotide that encodes a protein having aryloxyalkanoate dioxygenase activity, resistance to 2,4-dichlorophenoxyacetate (2,4-D) at claim 11, and a plant regenerated therefrom at claim 15. Kaphammer teaches an isolated polynucleotide that encodes a protein having aryloxyalkanoate dioxygenase activity at SEQ ID NO: 1. Kaphammer teaches transforming a soybean cell at Example 11, columns 21-22. Kaphammer teaches a

Art Unit: 1638

method of controlling weeds by applying 2,4-D herbicide to a crop field at column 2, lines 26-28. Kaphammer teaches that a transgene that confers resistance to glyphosate can also be introduced into the plant cell (column 3, lines 11-6).

Kaphammer does not teach an isolated nucleic acid encoding instant SEQ ID NO: 2 or having the nucleotide sequence of instant SEQ ID NO: 1. Kaphammer does not teach introducing a polynucleotide that confers glufosinate resistance.

Schleinitz *et al* teach an isolated polynucleotide comprising instant SEQ ID NO: 1 at GenBank accession number AY327575 (page 5359, right column, 5th paragraph). The encoded protein (see FIG 2 on page 5360) would naturally have aryloxyalkanoate dioxygenase activity.

Pallett *et al* teach introducing polynucleotides to a transformed plant cell that renders said plant cell resistant to multiple herbicides including glyphosate (column 1, lines 62-64) and glufosinate (column 2, lines 27-29).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the teachings of Kaphammer to introduce a polynucleotide encoding instant SEQ ID NO: 2 as taught by Schleinitz *et al* in addition to a polynucleotide encoding resistance to glyphosate and glufosinate as suggested Pallett *et al*. Given the success of Pallett *et al*, and Kaphammer one of ordinary skill in the art would have had a reasonable expectation of success. Given dichlorprop was a known herbicide as taught by Schleinitz *et al* (page 5357, left column, 1st paragraph), one of ordinary skill in the art would have been motivated to introduce said polynucleotide encoding instant SEQ ID NO: 2 into a plant cell. Application of herbicide prior to

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planting (instant claim 95) or as a pre-emergence application (instant claim 96) to control weeds would have been obvious to one of ordinary skill in the art at the time of Applicants' invention as such application would have been a design choice in the instant art.

Conclusion

13. No claims are allowed.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David H. Kruse, Ph.D. whose telephone number is (571) 272-0799. The examiner can normally be reached on Monday to Friday from 8:00 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached at (571) 272-0975. The central FAX number for official correspondence is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group Receptionist whose telephone number is (571) 272-1600.

/David H Kruse/
Primary Examiner, Art Unit 1638
8 July 2011

Notice of References Cited	Application/Control No. 12/091,896	Applicant(s)/Patent Under Reexamination WRIGHT ET AL.	
	Examiner DAVID H. KRUSE	Art Unit 1638	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,608,147	03-1997	Kaphammer, Bryan J.	800/294
*	B	US-7,250,561	07-2007	Pallett et al.	800/300
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
*	U	Schleinitz et al, September 2004, Applied and Environmental Microbiology 70(9): 5357-5365.
	V	Fourgoux-Nicol et al 1999, Plant Molecular Biology 40: 857-872.
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes 	Application/Control No. 12091896	Applicant(s)/Patent Under Reexamination WRIGHT ET AL.
	Examiner DAVID H KRUSE	Art Unit 1638

SEARCHED			
Class	Subclass	Date	Examiner
EAST	EAST	7/8/2011	/DK/

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor Name Search	7/8/2011	/DK/
EAST: USPAT, USPGPUB, EPO, JPO, DERWENT	7/8/2011	/DK/
STN: AGRICOLA, BIOSIS, EMBASE, CAPLUS	7/8/2011	/DK/
Sequence Search including interference Id NOs: 1-6	6/3/2011	/DK/

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

	/DAVID H KRUSE/ Primary Examiner.Art Unit 1638
--	---



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BIB DATA SHEET

CONFIRMATION NO. 6428

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
12/091,896	11/03/2008	800	1638	DAS-PO129-US-02		
RULE						
APPLICANTS Terry R. Wright, Westfield, IN; Justin M. Lira, Fishers, IN; Terence Anthony Walsh, Zionsville, IN; Donald J. Merlo, Camel, IN; Jayakumar P. Samuel, Carmel, IN; Gaofeng Lin, Zionsville, IN;						
** CONTINUING DATA ***** This application is a 371 of PCT/US06/42133 10/27/2006 /DK/ which claims benefit of 60/731,044 10/28/2005						
** FOREIGN APPLICATIONS ***** NONE /DK/						
** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 05/10/2011						
Foreign Priority claimed ☐ Yes ☒ No 35 USC 119(a-d) conditions met ☐ Yes ☒ No Verified and /DAVID H KRUSE/ Acknowledged Examiner's Signature		☐ Met after Allowance /DK/ Initials	STATE OR COUNTRY IN	SHEETS DRAWINGS 3	TOTAL CLAIMS 15	INDEPENDENT CLAIMS 2
ADDRESS Baker & Daniels LLP- Dow AgroSciences 300 North Meridian Street, Suite 2700 Indianapolis, IN 46204 UNITED STATES						
TITLE Novel Herbicide Resistance Genes						
FILING FEE RECEIVED 1270	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit		

EAST Search History**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	4	Delftia and sdpA	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2011/07/08 16:12
L2	681	dioxygenase and "2,4-D"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2011/07/08 16:18
L3	195	l2 and herbicide.clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2011/07/08 16:18

7/ 8/ 2011 4:19:32 PM**C:\Users\dkruse\Documents\EAST\Workspaces\12091896.wsp**

Substitute for form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Complete if Known	
				Application Number	12/091,896
				Filing Date	April 28, 2008
				First Named Inventor	Terry R. Wright, et al.
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U.S. PATENT DOCUMENTS					
*EXAMINER INITIAL	Cite No.	DOCUMENT NUMBER	Publication Date MM-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code (if known)			
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		Country Code-Number-Kind Code (if known)				
/DK/	AT	WO 2005/107437	11-2005	Wright, et al.	All	
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Substitute for form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Complete if Known	
				Application Number	12/091,896
				Filing Date	April 28, 2008
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				Examiner Name	Not Assigned
Sheet	2	of	2	Attorney Docket Number	DAS-P0129-US-02

NON PATENT LITERATURE DOCUMENTS		
*EXAMINER INITIAL	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
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Isolation of rapeseed genes expressed early and specifically during development of the male gametophyte

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Abstract

A cDNA subtraction and differential hybridization strategy was used to isolate cDNAs expressed early during male gametophyte development in the important crop species *Brassica napus*. Three cDNAs, corresponding to genes highly and specifically expressed at the tetrad and microspore stages, are presented here. The analysis of one of them, named *BnM3.4*, by *in situ* hybridization, showed that it is expressed specifically and at a high level in the rapeseed microspore. The specificity in its profile of expression is most likely transcriptionally controlled as a similar pattern of expression was also observed in *Arabidopsis thaliana* plants transformed by the *BnM3.4* promoter fused to the reporter GUS-coding sequence. The putative *BnM3.4* promoter contains three dispersed copies of a motif described previously in the promoters of several genes expressed in the male gametophyte. The *BnM3.4* gene encodes a predicted novel proline-rich protein of 23.4 kDa which may interact with cytoskeletal components or have a structural role in the cell wall.

Introduction

Pollen development in angiosperm plants occurs in a specialized floral organ, the anther. It starts by a series of mitotic divisions of archeosporial cells from the primary sporogenous layer leading to the formation of meiocytes. Each meiocyte undergoes meiosis to generate a tetrad of four haploid microspores surrounded by a callose wall, whose digestion then liberates them into the anther locule. A complex extracellular matrix composed of intine and exine is built around the male gametophyte after microspore differentiation. An asymmetric cell division of each microspore produces the bicellular pollen grain in which the large vegetative cell encloses the smaller generative cell. This latter cell has a condensed nucleus and a reduced cytoplasm. In the majority of plant species, the second mitotic division of the generative cell occurs after pollination

within the growing pollen tube producing two sperm cells. In some genera such as *Brassica* this second pollen mitosis occurs earlier during pollen maturation. The pollen grain is hence released from the anther locule in a tricellular form. This developmental programme is necessary to prepare the pollen grain for efficient interaction with the stigma, for rapid germination and pollen tube growth, and for successful delivery of sperm cells to the ovules (Bedinger *et al.*, 1994).

Despite the wealth of descriptive studies on the structural and physiological aspects of pollen formation, our understanding of the molecular events remains rather limited. Our main goal is to extend our knowledge on microspore differentiation and development through the identification and characterization of novel genes specifically expressed during early stages of microgametogenesis. Such genes may also provide alternative methods for controlling male fertility in economically important plants, such as in our case *Brassica napus*. To identify genes that might be

The nucleotide sequence data reported will appear in the EMBL, GenBank and DDBJ Nucleotide Sequence Databases under the accession number AF136223 (*BnM3.4*).

implicated in the developmental process, differential screening of cDNA libraries constructed from whole anthers has been the most commonly used approach. A number of genes have been shown to be expressed in developing pollen, as well as in the tapetum or other sporophytic tissues of the anther (Ursin *et al.*, 1989; Koltunow *et al.*, 1990; Nacken *et al.*, 1991; Theerakulpisut *et al.*, 1991; Paul *et al.*, 1992; Aguirre and Smith, 1993; Robert *et al.*, 1993; Bucciaglia and Smith, 1994; Ross and Murphy, 1996). Some pollen-specific genes expressed after the first mitotic division and presumably playing a role in pollen development, maturation, germination or pollen tube growth have also been described (Hanson *et al.*, 1989; Brown and Crouch, 1990; Shen and Hsu, 1992; Weterings *et al.*, 1992; Brander and Kuhlemeier, 1995; Stanchev *et al.*, 1996; Yu *et al.*, 1998). Finally, so far, a single tobacco gene has been identified that shows a microspore-specific expression (Oldenhof *et al.*, 1996).

We report the isolation of cDNAs from *B. napus* that are expressed during early pollen development. During this work, we developed a novel combined approach by differential screening of a microspore cDNA library with a subtracted probe enriched for microspore-specific sequences. We describe here in detail the characterization of the structure and expression of the *BnM3.4* gene corresponding to the microspore-specific cDNA M3.

Materials and methods

Plant material

Plants of *B. napus* L. cv. Brutor were grown in an open field or under standard greenhouse conditions and were used for RNA and DNA isolation. *Arabidopsis thaliana* (Wassilevskija ecotype) plants used for transformation (Bechtold *et al.*, 1993) were grown in a greenhouse under standard conditions. Transgenic *A. thaliana* T₁ seedlings were selected in a greenhouse on sand, sub-irrigated with water containing Basta herbicide (7.5 mg/l phosphinothricine). Two months later, T₂ seeds were harvested individually. *In vitro* culture of seedlings for segregation analysis was done in a culture chamber on *A. thaliana* medium (Estelle and Somerville, 1987) containing 5 mg/l of phosphinothricine as selective agent.

RNA isolation and poly(A)⁺ RNA purification

Several grams of rapeseed flower buds from 0.2 mm to more than 4 mm in length were harvested in 4 different classes according to bud length. Bud length was measured from the base to the tip of the outermost sepal. Male gametophytes from graded floral buds were isolated and purified as previously described (Albani *et al.*, 1990) with a few modifications. After disruption of the buds in a blender with a solution of 10% sucrose (pH 7), the resulting suspension was filtered through 80 µm nylon mesh. Only the suspension containing microspores (from 2 to 3 mm buds) was filtered through 45 µm nylon mesh. After two washes, as described by Albani *et al.* (1990), the pellet was frozen in liquid nitrogen and stored at -80 °C if not immediately used for RNA extraction. The purified male gametophytes from the different classes of bud were disrupted by 3 cycles of pressurization (at 110 bar) depressurization in a mini-bomb (Bioblock Scientific, Illkirch, France) in 50% RNA extraction buffer and 50% phenol before performing RNA extraction as previously reported (Dean *et al.*, 1985).

Poly(A)⁺ RNAs were purified from total RNA using the mRNA purification kit from Pharmacia Biotech.

Total RNA was extracted from young rapeseed seedlings, total fertile and male-sterile buds, pistils, sepals and petals, roots, leaves and stems as described above.

cDNA library construction and cDNA subtraction

The procedure used for the isolation of organ-specific cDNA was based on an unpublished protocol from S. Lok and D.C. Baulcombe (Sainsbury Laboratory, John Innes Centre for Plant Science Research, Norwich, UK). It is the result of several reports on ligation-mediated PCR (Mueller and Wold, 1989), direct incorporation of biotin nucleotide during PCR (Lo *et al.*, 1988) and differential removal of biotinylated DNA by a streptavidin/phenol extraction procedure (Sive and St John, 1988; Wang and Brown, 1991) and was modified as follows.

The blunted 'tracer' cDNA (T) and the 'driver' cDNA (D) were synthesized from 3 µg of poly(A)⁺ RNA from microspores and male-sterile buds (Ogu-INRA) (Gourret *et al.*, 1992), respectively, using a kit from Pharmacia Biotech. An aliquot of the tracer cDNA was ligated to the *EcoRI/NotI* adaptor according to the kit's instructions and inserted into the

*Eco*RI site of λ gt10 and plated on non-permissive *Escherichia coli* strain C600 Hfl⁻ using Gigapack III packaging extract (Stratagene). The titre of the library was estimated at 1.7×10^7 pfu/ μ g of λ gt10 DNA.

A 200 ng portion of T and D cDNA (0.5 to 1 pmol of ends) was ligated to 280 pmol of the T (AATTCGC-CATGGATCTAGACC / pGGTCTAGATCCATG) and D (ATCAGTGATCGGCATGAGCTCG / pCGAGCT-CATGCCGA) specific linkers. A 50 ng portion of T and D DNA was then amplified for 12 cycles of PCR for the T (using the top T primer) and 30 cycles for the D using 50 nM Bio-11-dUTP (Sigma) and the top T primer. A 150 ng portion of amplified T was then subtracted with a 20-fold excess of biotinylated D for 24 h at 68 °C. The biotinylated DNA was then removed by the streptavidin/phenol extraction method. The subtraction step was repeated 2 times under the same conditions. 1/6 of the total subtracted tracer-driver (T-D) DNA was then amplified for 35 cycles using the T primer and the result was quantified on a gel. We chose to not directly clone the subtracted product as done by Rubinelli *et al.* (1998) but to use it as a probe to screen the microspore cDNA library in order to compensate the representational bias introduced by PCR.

Differential screening

A 20 ng portion of amplified subtraction product (T-D) and unsubtracted T cDNA were labelled at high specific activity with [³²P] dCTP with an oligolabelling kit (Pharmacia Biotech) (Feinberg and Vogelstein, 1985) and hybridized on duplicate filters (colony/plaque Screen filters, NEN Research Products, DuPont) containing approximately 20 000 plaques of the microspore cDNA library at 65 °C in 6× SSC for 24 h. The filters were washed in three steps of 30 min in 2×, 1× and 0.1× SSC with 0.1% SDS at 65 °C.

Only the clones showing a higher signal when hybridized with the T-D cDNA probe than with the T cDNA probe were selected and isolated. The accuracy of this choice was confirmed by a second round of hybridization realised in the same conditions on filters containing only the selected clones. Positive cDNA clones were purified and λ DNA was extracted as previously described (Albani *et al.*, 1990). cDNA inserts were isolated after *Not*I or *Eco*RI digestion and subcloned in pBluescript SK⁻ plasmid (Stratagene) digested by *Not*I or *Eco*RI.

Northern blot hybridization

A 10 μ g portion of denatured total RNA was loaded in each lane of a 1.5% agarose gel containing formaldehyde and transferred onto Hybond-N membrane (Amersham) according to the manufacturer's protocol. Prehybridization and hybridization were carried out in a buffer containing 5× SSPE, 5× Denhardt's solution, 100 μ g/ml sonicated salmon sperm DNA, 1% SDS and 50% deionized formamide at 42 °C for 6 h and 20 h, respectively. The selected cDNA fragments were gel-purified, labelled with [³²P] dCTP and used as probes for hybridization. The filters were washed at 65 °C in three 15 min steps in 0.1% SDS and decreasing salt concentrations (5×, 2× and 0.1× SSPE).

Genomic DNA library screening

350 000 recombinant clones (average size 15 kb) (three *B. napus* genome equivalents) of a genomic DNA library of *B. napus* cv. Bridger in bacteriophage λ EMBL-3 (Clontech, USA) were plated with *E. coli* LE392 as host. The entire M3 cDNA was used as a [³²P] dCTP-labelled probe for screening. Hybridization and washing were carried out with standard techniques (Sambrook *et al.*, 1989).

Determination of the 5' end of mRNA

The method was based on PCR using the 5'-AmpliFINDER RACE kit from Clontech.

Two antisense primers were designed from the *BnM3.4* coding sequence: P1, 5'-TGATGACTCTAGT TCTGTTGCTGTG-3' and P2, 5'-TGGAAATTCGTTCT GTTGCTGTGACTTTGGATGT-3', and we optimized the annealing temperature at 55°C for the step of PCR amplification. The experiment was performed with 2 μ g of mRNA extracted from *B. napus* microspores, from *B. napus* floral buds and from *B. napus* leaves for the negative controls. Thereafter PCR products were digested by *Eco*RI and cloned into pBluescript SK⁻ for sequencing.

Genomic DNA isolation and Southern blot hybridization

Genomic DNA was purified from seedling leaves using a standard procedure (Dellaporta *et al.*, 1983) followed by standard CsCl gradient centrifugation. Southern analysis was performed by digestion of 10 μ g of genomic DNA, electrophoresis of DNA

fragments on a 0.8% agarose gel and blotting onto Hybond-N membrane using standard methods (Sambrook *et al.*, 1989). The M3 cDNA fragment was gel-purified and labelled with [^{32} P] dCTP as described previously. A Southern blot was hybridized overnight at 65 °C in 6 $\times$ SSC and washed at 65 °C in three 15 min steps in 0.1% SDS and decreasing salt concentrations (6 $\times$, 2 $\times$ and 0.1 $\times$ SSC).

Plasmid construction

Recombinant DNA techniques were carried out as described by Sambrook *et al.* (1989) to construct a transcriptional fusion bringing the expression of the *uidA* (commonly named *gus*) reporter gene under the control of the *BnM3.4* promoter in binary vector.

A 'promoterless' *gus* gene cassette, containing the *gus* coding sequence (Jefferson *et al.*, 1986) and the nopaline synthase polyadenylation site (*nos-ter*; Bevan *et al.*, 1983) was cloned into pBluescript SK– (Stratagene, USA), leading to pAF1opt. A 2056 bp *Bam*HI–*Nsp*V fragment (Figure 3) from the genomic clone *BnM3.4* was cloned into *Bam*HI–*Cla*I sites of the plasmid pAF1opt, generating pJD51. The chimaeric gene was then excised from pJD51 and introduced into the binary plasmid pEC2 (Cartea *et al.*, 1998) in inverse orientation with respect to the Basta resistance gene, generating pJD101. The promoterless *gus* gene cassette was also transferred into pEC2 to generate the negative control binary plasmid pAF100. The binary plasmids pAF100 and pJD101 were introduced into *Agrobacterium tumefaciens* strain C58C1 (Koncz and Schell, 1986) by electroporation (Nagel *et al.*, 1990; Singh *et al.*, 1993). The recombinant genes were introduced into *A. thaliana* by *in planta* infiltration (Bechtold *et al.*, 1993).

In situ hybridization

The *BnM3.4* coding sequence was cloned in both orientation in pGEM-3Zf(+) (pJD6 and 7). After *Sma*I linearization, these two plasmids were used to synthesize digoxigenin-11-rUTP-labelled probes using the Riboprobe Combination System T7 kit from Promega.

B. napus floral buds were fixed in 4% formaldehyde, embedded in wax, and 8 μ m-sections were prepared for *in situ* hybridization according to Jackson (1991).

Full-length RNA probes were alkaline-hydrolysed to 150 nt fragments and hybridized to sections at a concentration of 0.5 ng/ml per kb of probe. Hybridization was carried out in 210 μ l for a sandwich of

two slides at 50 °C in 50% formamide, 10% dextran sulfate, 1 $\times$ Denhardt's solution, 0.3 M NaCl, 10 mM Tris-HCl pH 8, 1 mM EDTA, 1 mg/ml yeast transfer RNA. Slides were washed in several baths of 0.2 $\times$ SSC at 55 °C for 1 h, followed by two rinses of 5 min each with 0.5 M NaCl, 10 mM Tris-HCl (pH 7.5), 1 mM EDTA (NTE buffer), and treated with 20 mg/ml RNase A in this buffer at 37 °C for 30 min. The slides were then washed again in NTE buffer and 0.2 $\times$ SSC as described above, and finally washed in PBS (130 mM NaCl, 7 mM Na₂HPO₄, 3 mM NaH₂PO₄, pH 7) for 5 min. Immunological detection of the hybridized probe was carried out as described in the Boehringer digoxigenin-nucleic acid detection kit with some modifications. Slides were incubated with gentle agitation for 1 h in 0.5% blocking agent (Boehringer) in buffer 1 (100 mM Tris-HCl, 150 mM NaCl, pH 7.5) followed by 1 h in 1% bovine serum albumin, 0.3% Triton X-100 in buffer 1 (buffer 2). This was followed by a 1 h incubation in dilute antibody conjugate (Boehringer) (1:1250) in buffer 2 and 4 washes of 15 min each in buffer 2. Slides were briefly washed in 100 mM Tris-HCl pH 9.5, 100 mM NaCl, 50 mM MgCl₂ and incubated for 12–48 h in 0.34 mg/ml nitroblue tetrazolium salt and 0.175 mg/ml 5-bromo-4-chloro-3-indoyl phosphate toluidinium salt in 100 mM Tris-HCl pH 9.5, 100 mM NaCl, 50 mM MgCl₂. The colour reaction was stopped with 10 mM Tris-HCl pH 8.0, 1 mM EDTA, and sections were passed through an ethanol series before mounting in mounting medium from Sigma.

Histochemical GUS assays

Histochemical assays for GUS activity were conducted according to the protocol described previously by Jefferson *et al.* (1987) with some modifications. Fresh tissue samples were fixed in a solution containing chloroform, 95% ethanol and water in proportions 3:6:1 and 0.1% Triton X-100 under vacuum (–93.3 kPa) for 1 min. Then, tissue samples were washed twice in 50 mM potassium phosphate buffer, pH 7.0. GUS staining was performed by vacuum infiltration (3 $\times$ 10 min at –93.3 kPa) in the GUS stain solution (Jefferson *et al.*, 1987) and by incubating at 37 °C overnight. The plant material was then cleared by rinsing with 70% ethanol and the samples were examined and photographed under a Diaplan type 307-148.002 microscope (Leitz, Wetzlar, Germany).

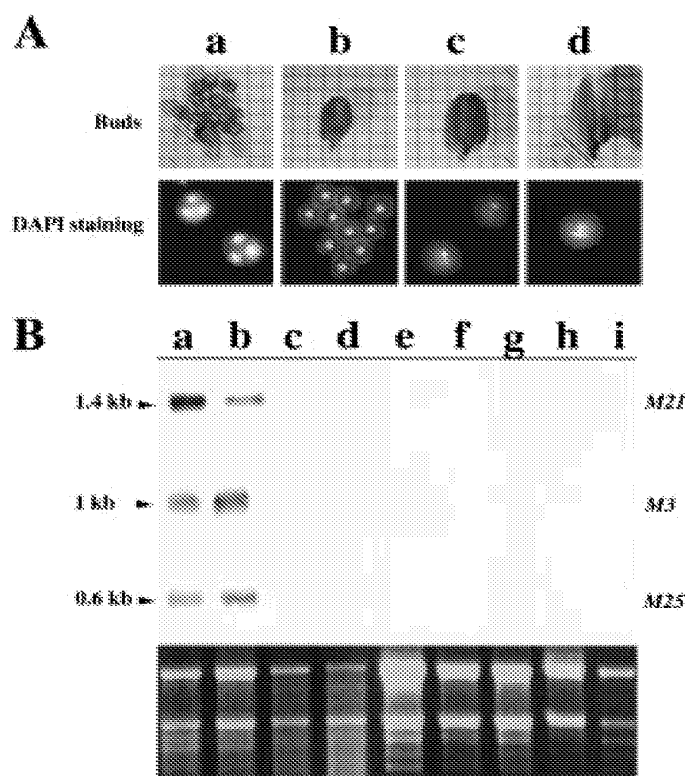


Figure 1. Correlation between the size of rapeseed flower buds and microgametophytic stage of development. Expression pattern of the M21, M3 and M25 clones isolated by subtraction and differential screening of the microspore cDNA library. A. DAPI staining of the four different developmental stages during male gametogenesis (in the lower part) and the corresponding buds (in the upper part). a, DAPI-stained tetrads and earlier stages (not shown) contained in buds of length strictly below 2 mm; b, microspores contained in buds of 2–3 mm; c, bicellular pollen contained in buds of 3–4 mm; d, tricellular pollen contained in buds of 4.5 mm and more. Each square is 1 mm $\times$ 1 mm. B. Northern blot experiments hybridized with M21, M3 and M25 cDNA clones as probes. Total RNA (10 μ g) from (a) meiocyte/tetrads, (b) microspores, (c) young (binucleate) and (d) mature (trinucleate) pollen, (e) sepals, (f) petals, (g) wild type and (h) CMS buds, and (i) *in vitro* grown seedlings were loaded on the gel. The picture of the corresponding ethidium bromide stained gel is presented underneath.

The pistil length was used as the unique criterion for identification of the stages of microsporocyte development in *A. thaliana*. Based on results of Bowman (1994), the correlation between the pistil length (pl) and the stages of microsporocyte development was further studied (D. Vezon, personal communication) and we found that a pl of 0.3–0.4 mm corresponds to meiosis; pl 0.5 mm corresponds to the end of meiosis and tetrad microspores; pl 0.75 corresponds to free microspores; pl 1.25 mm corresponds to the first pollen mitosis and bicellular pollen; pl 1.50 mm corresponds to the second pollen mitosis and tricellular pollen.

Results

Isolation of B. napus cDNAs encoding sequences expressed early during pollen development

Cytological studies (Scott *et al.*, 1991) have shown that the stages of male gametogenesis within the anther are highly correlated to bud length and that gametogenesis is synchronised in all anthers of one flower bud.

The cytological studies allowed us to establish that, in the growth conditions we used, rapeseed buds of length strictly below 2 mm contained mainly meiocytes and tetrads, 2 to 3 mm long buds contained

M3	.....	.....	.....	.....	.....	.....	.....	.....	80
M3.21	TCTTGCTATG	ATTTCCTCA	TAAGATGTGT	CACATCCAAA	GTACACAGAA	CAGAACTAGA	GTCATCAACT	AACCAAGAGC	
M3	.....	.....	.....	.....	.....	.....	.....	.....	160
M3.21	TCTTCCTATC	GCGGCACCTG	CCTCGCTTTC	ACCCCAAGCC	ACATTGGCCG	TTCTGTGGCT	CCGGAAGAGC	CTTCCCTGCA	
M3	.....	.....	.....	.....	.....	.....	.....	.....	240
M3.21	GGCCACTTCC	GACCAACTCC	GTTCCATCTG	CCACAGGAAG	TCACCAGATG	CTGTGCCGAC	AAGAAGGAGG	TAGGTACATG	
M3	.....	.....	.....	.....	.....	.....	.....	.....	320
M3.21	TTTGTATGAT	ATCGTTGAGA	CTTCTTCAC	CAGGAAGGCC	GTTATTGGAT	CGGAATGTTG	CGCCGCGATC	AAGAAGATGA	
M3	.....	.....	.....	.....	.....	.....	.....	.....	400
M3.21	ACAAAGATTG	TGAGAAGACC	GTCTTGGAT	CTTTCCATGA	CCCTTCTTG	ACCGGCTATG	TCAAGCTACA	TTGCTCCACC	
M3	.....	.....	.....	.....	.....	.....	.....	.....	480
M3.21	GTGTGTGGAT	CTACTTCACC	TCCTCCTTCA	CAGGCTCCTT	TACATGCTCC	TTCTTCACAG	GCTCCTTCAC	ATGCTCCTTC	
M3	.....	.....	.....	.....	.....	.....	.....	.....	560
M3.21	ACATGCTCCT	TCACAGGCTC	CTTTAAATGC	TCTTTTAAAT	GCTCCTTTAC	ATGCTCCTTT	ACATGCTCCT	TCACAGGCC	
M3	.....	.....	.....	.....	.....	.....	.....	.....	640
M3.21	CTTCACAGGC	CCCTTCACAG	GCCCCTTTAC	ATGCTCCTTT	ACTGCCCCCT	TCGCAGGCTC	CTTCACCGGC	TCAGTGA-TT	
M3	.....	.....	.....	.....	.....	.....	.....	.....	720
M3.21	TAGCTATTTG	ATAGAATTAC	TCAAGTAATG	ATGCCCTAGG	GAGTTTGAGT	TTTCTCGTG	TTTTAAAGTT	TGTGTATTAT	
M3	.....	.....	.....	.....	.....	.....	.....	.....	800
M3.21	TTTGAGAAAA	CCGTCTTTGG	ATTTTAACTT	CACTTTGATT	TTTTCCCTTA	TACAATTAA	ATTTAGAGTT	TACTTATTAA	
M3	.....	.....	.....	.....	.....	.....	.....	.....	841
M3.21	TTTTATAAAT	TAGATGGTAC	TAAGTTTTTA	TCATAATAAA	A				

Figure 2. Comparison of M3 and M3.21 cDNA sequences. Numbers at the right margin refer to the nucleotide position. Dashed lines indicate gaps and underlined sequences represent imperfect repeated motifs found in the M3 and M3.21 sequences. The stop codons are shown in bold type.

mainly microspores, 3 to 4 mm long buds contained mainly bicellular pollen grains and buds of 4.5 mm and more in length contained mature tricellular pollen grains (Figure 1A). RNAs were prepared from male gametophytes purified from buds at these four stages. To achieve this we had to develop a new technique (see Materials and methods) to lyse the microspores which have extremely resistant cell walls. To obtain a driver for the subtraction procedure, we isolated RNA from whole male-sterile flower buds (Ogu-INRA). These buds are identical to those of wild type except that male gametophyte development is arrested before the tetrad stage and consequently they do not contain any microspores (Gourret *et al.*, 1992).

Poly(A)⁺ RNAs from microspores were converted to cDNA, of which a fraction was used to construct a cDNA library. To generate probes enriched for microspore-specific transcripts, another fraction of the above microspore cDNA was then subtracted sev-

eral times by hybridization with cDNA made from male-sterile buds (see Materials and methods). We then screened the microspore cDNA library using subtracted and primary probes. After two rounds of such successive screens, we retained 32 potential candidates that showed increased hybridization to the subtracted probe with respect to the unsubtracted microspore cDNA probe.

The expression pattern of selected clones was compared in more detail by slot blot (data not shown) and by northern blot analyses with total RNA isolated from the four same developmental stages of male gametophyte as above, entire wild-type and male-sterile buds, sepals, petals and *in vitro* grown seedlings or leaves. These expression studies allowed us to classify these genes into four groups.

The first group consists of 13 clones whose expression is strictly confined to the male gametophyte and high in the microspore. The second group contains 13

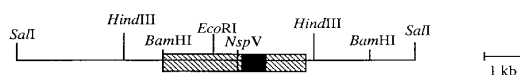


Figure 3. Analysis of the *BnM3.4* gene. Partial restriction map of the *BnM3.4* genomic clone. The striped box represents the sequenced region of the *BnM3.4* genomic clone; the black one the coding sequence of the *BnM3.4* gene. The two *SalI* sites border the 10 kb insert.

clones whose expression is high in the microspores but not restricted to the male gametophyte since they are also expressed in other sporophytic tissues. The third and fourth groups correspond respectively to 2 clones having a weak expression restricted to microspores and 4 clones showing weak expression in all tissues tested.

We characterized further three cDNAs belonging to the first group of genes expressed early and specifically during male gametophyte development. Northern blot analyses of these clones are shown in Figure 1B. The M21 gene detected a mRNA of 1.4 kb (encodes potentially a novel protein), which is expressed at the meiocyte and tetrad stages but its mRNA level remains high in the microspore. The M25 cDNA detected a 0.6 kb mRNA (encoding a putative SKP1-like protein (Connelly and Heiter, 1996; Krek, 1998)), mainly in the microspore but expression was also detected at meiocyte/tetrad stages and in bicellular pollen. The M3 cDNA detected a 1.0 kb mRNA in microspores but expression was also evident in meiocyte/tetrad stages. We have chosen to focus on this particular clone for further studies because extensive hybridization studies using a variety of sporophytic tissues (data not shown) suggested that the M3 mRNA is highly early stage microspore-specific.

Analysis of the nucleotide sequences of M3 and M3.21 cDNAs

The M3 cDNA has a length of 497 bp. It was smaller than the 1.0 kb mRNA detected on northern blots, so M3 is likely to be a partial cDNA. A second screening of the microspore cDNA library was performed using M3 as probe. A longer but still partial clone, named M3.21, of 674 bp was then isolated. The expression pattern of the M3.21 cDNA was checked by northern blot (data not shown) and appeared to be identical to the M3 pattern. Both cDNA clones, M3 and M3.21, were subcloned into pBluescript SK[−] and sequenced. Alignment of their nucleotide sequences shows that the M3 cDNA differs essentially from M3.21 by an

insertion of 99 bp constituted by three repeats of the same motif (Figure 2).

M3 cDNA and the corresponding BnM3.4 genomic clone: DNA sequence comparisons and analyses

The M3 cDNA was used as a probe to screen a *B. napus* genomic DNA library in order to isolate the corresponding gene. One of the isolated clones, BnM3.4, with an insert size of 10 kb, was selected for further characterization (Figure 3). A 2.9 kb sequence surrounding the *BnM3.4* gene was deposited in the EMBL, GenBank and DDBJ nucleotide sequence databases under the accession number AF136223. Two putative in-frame translation start codons, separated by 114 bp and leading to 2 ORFs of 712 bp and 598 bp, were detected (respectively at 1971 and 2085 nucleotides from the start of the sequence). Comparison of the M3 cDNA sequence with the sequence of the shortest ORF of the genomic clone revealed 1 difference out of 293 bp of aligned coding sequence and 7 differences out of 203 bp of aligned 3'-downstream region. These sequence differences between genomic and cDNA clones were repeatedly found in independent sequencing experiments and might be due to allelic variations between the different *B. napus* varieties used in the construction of the cDNA and genomic libraries. No intron was detected in the region covered by the cDNA and no intron/exon junctions were found in the rest of the ORF using a splice site prediction program (Hebsgaard *et al.*, 1996). A putative polyadenylation signal (Joshi, 1987b) was found 197 bp downstream of the stop codon. Because we are ultimately interested in the regulation of pollen and anther-specific genes, we first determined by 5' RACE which of the two potential start codons in M3/M3.21 are used exclusively or preferentially. Sequences of 12 PCR fragments revealed two groups of products. The first group contained seven sequences identical to the *BnM3.4* gene (PCR1 in Figure 4). The longest PCR product showed that the transcription start of the *BnM3.4* gene is a G (underlined on Figure 4), localized between the two potential translation starts. Primer extension experiments (data not shown) indicated approximately the same nucleotide for the transcriptional start site. The length between the transcriptional start site and the second ATG (64 bp), is in agreement with the predominant length of leader sequences (40–80 nucleotides) in plant genes (Joshi, 1987a). Moreover, the context of the second ATG agrees well with the consensus sequence (AAorCAAUGGC) proposed for

BnM3.4	-21	AACCCCTAACG	CCTTACCACT	CGATAACCAT	CAAAACTTTT	CTTCTCGTTT	29
PCR1		.....	.....	.GATAACCAT	CAAAACTTTT	CTTCTCGTTT	
PCR2		.....	.....ACT	CAATAACCAT	CAAAACTTTT	CTTCTCGTTT	
BnM3.4		CGCTAACTCA	AGGCTTCGAA	AAGTAAAAA	AACAATGAAG	AATGTCACAC	79
PCR1		CGCTAACTCA	AGGCTTCGAA	AAGTAAAAA	AACAATGAAG	AATATCACAC	
PCR2		CGCAAACTCA	AAGCTTCAAA	AAGT---AAG	AACAATGAAG	AATGTCTCAC	
BnM3.4		TGTTCTTGC	TATGATCCTC	TTCTTAAGCT	GTGTCACATC	CAAAGTTACA	129
PCR1		TGTTCTTGC	TATGATCCTC	TTCTTAAGCT	GTGTCACATC	CAAAGTTACA	
PCR2		TGTTCTTGC	TATGATCCTC	TTCTTAAGCT	GTGTCACATC	CAAAGTCACA	
BnM3.4		GCAACAGAAC	TAGAGTCATC	AACTAACCAA	GAGCTCTTCC		169
PCR1		GCAACAGAAC	.....	.....	.....		
PCR2		GCAACAGAAC	.....	.....	.....		

Figure 4. Alignment of the *BnM3.4* gene sequence and the longest representatives of the two types of products PCR1 and PCR2 from the 5' RACE PCR on mRNA from *B. napus* microspores. Dashed lines indicating gaps and nucleotide differences are reported in bold type in PCR2. The transcription start site (C) is underlined (in *BnM3.4* and PCR1) and the ATG codon is in bold type.

dicotyledon nuclear genes by Joshi *et al.* (1997). A clear TATA box sequence (TATATATA) was identified 31 nucleotides upstream of the start of transcription (Messing *et al.*, 1983). The second group of 5' RACE PCR products (PCR2 in Figure 4) presents several nucleotide differences with respect to the first group. The detection of this second group proves that a second gene closely related to *BnM3.4* exists and is expressed in the microspore at approximately the same level as *BnM3.4*. It should not correspond to allele variation of *BnM3.4* because cv. Brutor used to make the cDNA library and the 5' RACE experiments is an inbred line. This gene may correspond to the M3.21 cDNA but M3.21 is too short at its 5' end to enable us to compare it to the PCR2 sequences and determine whether they come from the M3.21 type mRNAs. To ascertain this, a Southern blot analysis was performed on total DNA extracted from *B. napus* cv. Brutor and digested by *Bam*HI, *Eco*RI and *Hind*III. The DNA gel blot was hybridized with ³²P-labelled M3 cDNA at high stringency. As shown in Figure 5, in addition to the 5 kb *Hind*III and 5.5 kb *Bam*HI fragments corresponding to the *BnM3.4* genomic clone, the *B. napus* genome contained other fragments which were clearly recognized by the M3 cDNA probe, consistent with the idea of at least one other expressed homologue in *B. napus*. These homologous genes will be called the *BnM3* family.

Characteristics of the putative *BnM3.4* protein

The *BnM3.4* gene encodes a putative 218 amino acid protein with a molecular mass of 23.4 kDa and a predicted pI of 8.8. The predicted *BnM3.4* protein shows limited similarity with two potential *A. thaliana*

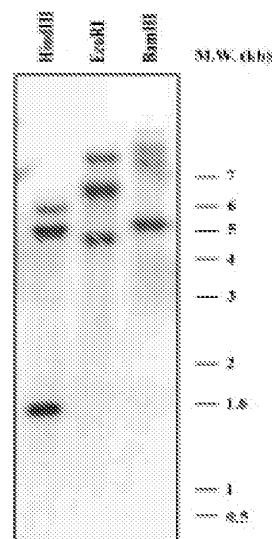


Figure 5. Southern blot analysis of genomic DNA from *B. napus* (cv. Brutor). A 10 µg portion of genomic DNA was digested with *Bam*HI, *Eco*RI and *Hind*III. Hybridization was performed with ³²P-labelled M3 cDNA as probe. DNA size standards (in kb) are shown to the right of the figure.

products of genomic clones MKP11 (accession number AB005238) and K19P17 (AB007644). The N-terminal 152 aa of *BnM3.4* is 55% identical (69% similarity) to MKP11, while the carboxyl portion of *BnM3.4* is 45% identical (63% similarity) to K19P17. These two translated sequences do not correspond to two exons of the same gene since they are separated

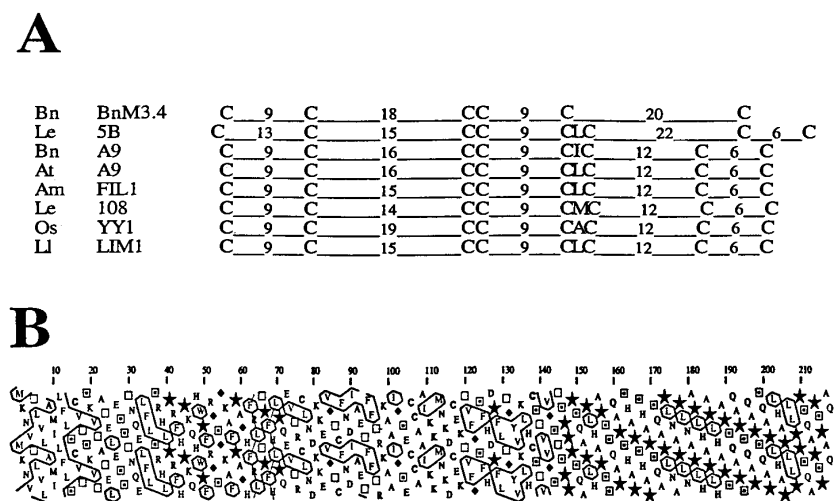


Figure 6. BnM3.4 protein characteristics. **A.** Cysteine pattern alignment of the BnM3.4 protein with sequences of seven stamen-specific genes. The number of amino acids between cysteine residues is given, but the spacing is not proportional. Le 5B, *Lycopersicon esculentum* TomA5B (Aguirre and Smith, 1993); Bn A9, *Brassica napus* A9; At A9, *Arabidopsis thaliana* A9 (Paul *et al.*, 1992); Am FIL1, *Antirrhinum majus* FIL1 (Nacken *et al.*, 1991); Le 108, *Lycopersicon esculentum* 108 (Chen and Smith, 1993); Os YY1, *Oryza sativa* YY1 (Hihara *et al.*, 1996); Li LIM1, *Lilium longiflorum* LIM1 (Kobayashi *et al.*, 1994). The amino acid sequences were deduced from DNA sequences. **B.** HCA (Hydrophobic Cluster Analysis) representation of the BnM3.4 protein. Amino acids are represented with one-letter symbols except for: proline (stars); glycine (diamonds); threonine (open squares); and serine (squares with dot). Hydrophobic clusters are endorsed by a black line.

by 16 Mb on the chromosome. The functions of these two putative *A. thaliana* gene products are not known.

The putative BnM3.4 protein, however, has three recognizable structural domains. The residues from 1 to 23 are hydrophobic, characteristic of a signal peptide, and a cleavage site between the alanine at position 23 and the threonine at position 24 can be predicted according to the rules of von Heijne (Nielsen *et al.*, 1997). From these features, the protein may be secreted and this N-segment may help the protein to cross or to interact with the membrane. The central part of the protein (residues 25–143) is hydrophilic. The spacing of six particular cysteines in this segment resembles that found in various stamen-specific proteins: TomA5B (Aguirre and Smith, 1993), FIL1 (Nacken *et al.*, 1991), A9 (Paul *et al.*, 1992), 108 (Chen and Smith, 1993), YY1 (Hihara *et al.*, 1996) and LIM1 (Kobayashi *et al.*, 1994). The possible relationship among these cysteine-rich proteins and the BnM3.4 protein is best illustrated by showing only their pattern of cysteine residues (Figure 6A). Although the BnM3.4 protein presents a shorter pattern than the others, the position and spacing of the cysteine residues are very similar.

The C-terminal domain consists of 14 repeats related to the motif P-[SL]-[HNQ]-A. Analysis of this domain by the Hydrophobic Cluster Analysis program (available at: www.lmcp.jussieu.fr/~soyer/www_hca/hca-form.html) suggests that the proline residues in the motifs could form the backbone of a rigid helical structure (Figure 6B).

In situ analysis of the expression of the BnM3 genes family

The pattern of *BnM3* expression during the four stages of gametogenesis (see above) was examined in bud tissues of *B. napus* by *in situ* hybridization using the *BnM3.4* antisense transcript as a probe. As at least two homologous genes are present in the *B. napus* genome, the hybridization pattern may reflect the expression pattern of (at least) these two genes. The *BnM3* transcripts were not detectable in anthers with pollen mother cells undergoing meiosis (data not shown), nor in tetrads (Figure 7A), nor in bicellular pollen (Figure 7G), nor in tricellular pollen (Figure 7I). However, at the developmental stage where rapeseed buds are 2.5 mm, a strong hybridization signal was detected in the microspore (Figure 7C). At high magnification

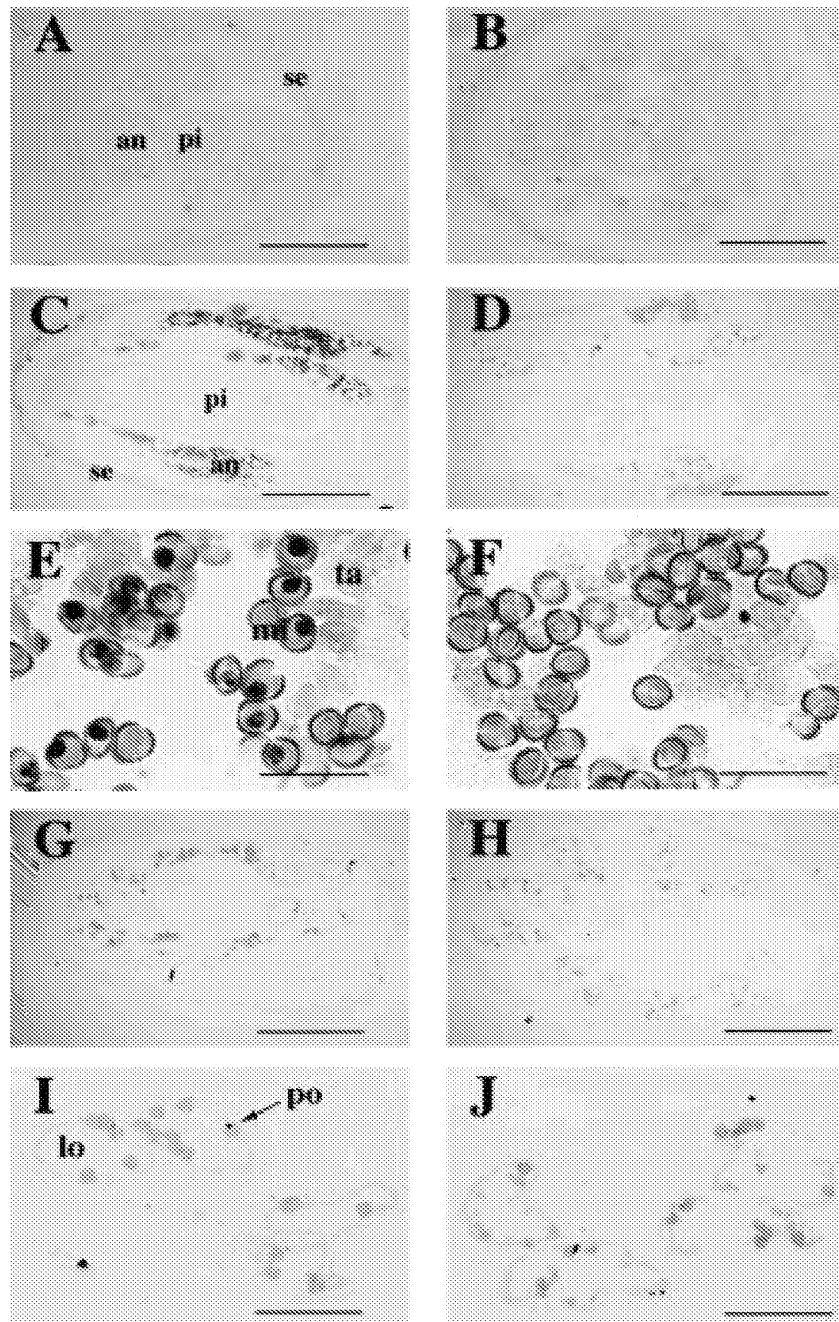


Figure 7. *BnM3.4* expression in floral buds of *B. napus*. *In situ* hybridization of DIG-labelled antisense (A, C, E, G and I) or sense (B, D, F, H and J) *BnM3.4* RNA probe to *B. napus* floral bud sections. A and B. Transverse sections of 1.5 mm long buds containing tetrads (bar = 4 μ m). C and D. Longitudinal sections of 2.5 mm long buds containing microspores (bar = 10 μ m). E and F. Magnification of anthers from transverse sections of 2.5 mm long buds (bar = 0.8 μ m). G and H. Transverse sections of 3.5 mm long buds containing bicellular pollen (bar = 10 μ m). I and J. Transverse sections of anthers from 4.5 mm long buds containing tricellular pollen (bar = 4 μ m). Abbreviations: an, anther; lo, locule; mi, microspore; pi, pistil; po, mature pollen; se, sepal; ta, tapetal cell.

(Figure 7E), the *BnM3* transcripts are clearly visible by a deep staining inside the microspores. No hybridization signal was detected in any male gametophyte tissue at any stage of development with the sense probe (Figure 7B, D, F, H, J). The lack of hybridization of some microspores with the antisense probe is probably an artefact caused by a partial section of the pollen grain or a loss of cytoplasm during the pretreatment of slides. Both the sense and the antisense probes allowed us to detect a weak hybridization signal in tapetal cells that could be considered as a background signal not specific to the *BnM3.4* transcripts.

The BnM3.4 promoter: regions of homology and functional analysis

A detailed analysis of the *BnM3.4* promoter sequence revealed the presence of several regions having possible regulatory functions. Two 14 bp repeats (tttaaaagtgaac) are located from -1852 to -1780 from the transcription start. A 14 bp palindromic sequence (ttagaatattctaa) is located at -307 while another 12 bp palindrome (ttttaattaaaa) starts at -213. These motifs have not been detected in any other pollen-specific gene. However, the motif 'tcattt', located between -593 and -517 and the reverse motif 'aatga', located at -1566 in *BnM3.4* upstream regions were already described for other pollen-specific genes like *NTP303* (Weterings *et al.*, 1995), *NTM19* (Oldenhof *et al.*, 1996) and *Bp10* (Albani *et al.*, 1992). A 2 kb region of this 5'-flanking sequence, containing these different regions was transcriptionally fused with the reporter *gus* coding sequence. The resulting construction (pJD101, see Materials and methods) was introduced into *A. thaliana*. This species was chosen for these experiments because it belongs to the same botanical family as *B. napus*, but it can be more easily transformed and has a shorter life cycle. GUS staining was first performed on the inflorescences of fifteen independent transgenic *A. thaliana* T₁ lines (JD101 series) transformed with this gene. They all showed qualitatively the same expression patterns in the course of gametophyte development (not shown). The progeny (T₂) of T₁ plants with insertion of the transgene(s)

presumably at a single locus was chosen for further analysis. The results of histochemical analysis of *gus* expression for individual hemizygous and homozygous progeny of one of them, JD101.42, are shown in Figure 8. This transformant presents one insertion according to the genetic test (275 phosphotricine resistant plants out of 380 seedlings; $\chi^2 = 1.40$; $P < 0.05$).

In all the transgenic JD101 plants and their progeny studied, no GUS activity was detected in flower organs other than the stamen as shown in Figure 8A for one hemizygote progeny of the JD101.42 plant. GUS activity was not detected in any organ of seedling (Figure 8I) or older plants (not shown), or in siliques (Figure 8J). In comparison, plants transformed with the control construction pAF100 (*gus* without promoter) showed no GUS activity (Figure 8A, inset). The presence of 50% of blue pollen and 50% of unstained pollen in anthers of the hemizygous JD101.42 plant (Figure 8H) confirms that the *BnM3.4* promoter is only activated in gametophytic cells i.e. only the transgenic pollen shows GUS activity.

The temporal pattern of *gus* expression was determined with homozygous JD101 progeny with the aim of precisely determining the developmental stage where the reporter gene is activated. At the tetrad stage of male gametophyte, no GUS activity was detected (Figure 8B); it only appears at a high level at the beginning of the microspore stage (Figure 8C). As shown in Figure 8E, high levels of GUS activity were detected in pollen. There seems to be a low level of the GUS product in the locule which may be the result of diffusion, but no activity was present in the sporophytic tissues of the anther such as the epidermis, the endothecium and the tapetum. The GUS expression level stays constant until the mature tricellular pollen stage (Figure 8D, 8F and 8G) but it is difficult to know if this is due to the longevity of the GUS protein or transgene activity in *Arabidopsis*.

At least for the first stages of male gametophyte development, the reporter gene has the same expression pattern as intact genes.

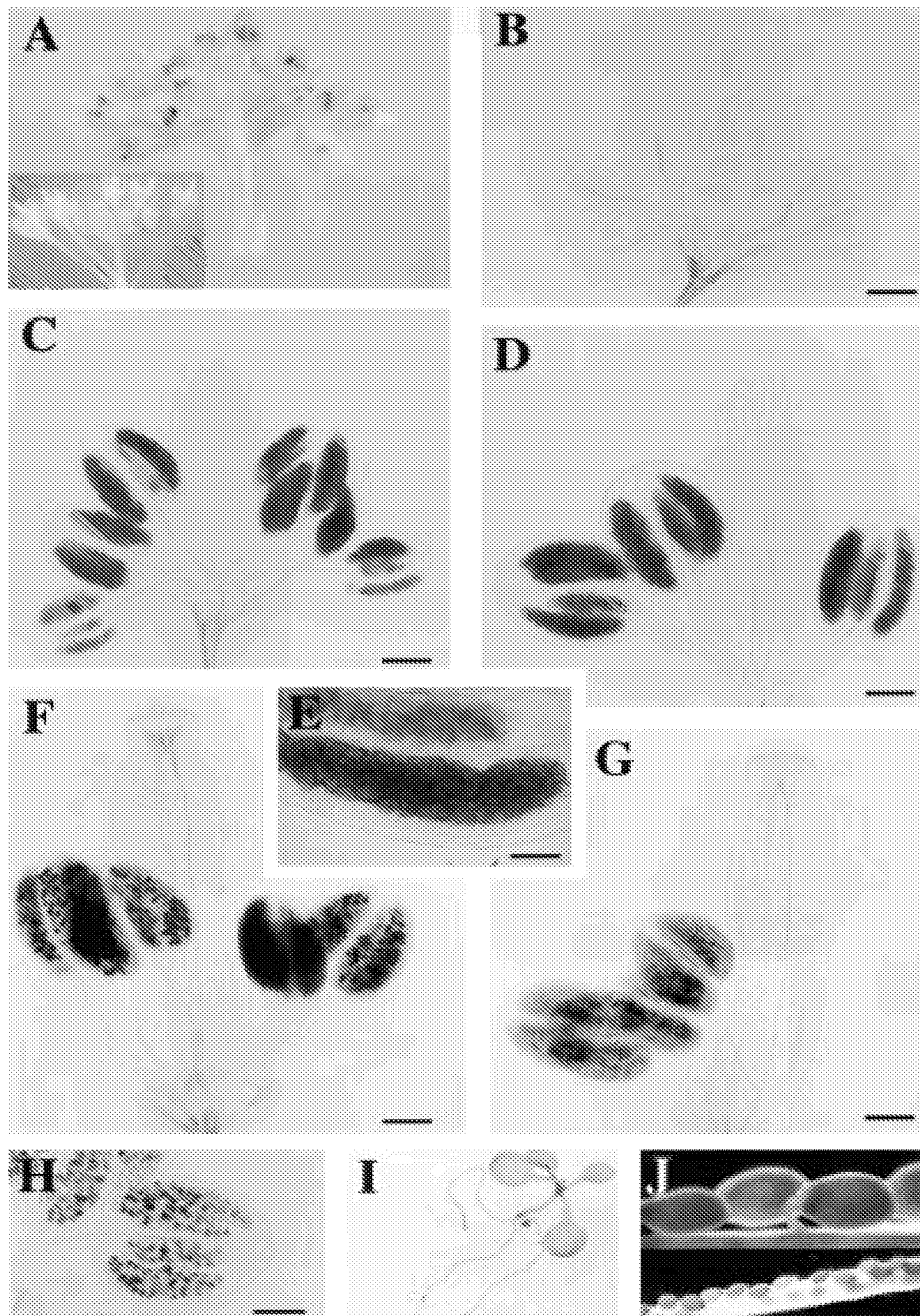


Figure 8. Histochemical analysis of *gus* expression in transgenic *A. thaliana* JD101 plants. The following plant materials from homozygous and hemizygous JD101.42 transgenic plants and from a AF100 transgenic plant were examined for GUS activity as described in Materials and methods. A. Inflorescence from a 5-week old homozygous pJD101 plant and (in the inset) the inflorescence from a 5-week old AF100 plant (negative control plant). B–G. Developmental series of buds from the stained inflorescence presented above. Sepals and petals were removed from the bud in order to measure the pistil length more easily and to improve the visualization of GUS in anthers. The stages of male gametophyte development were determined according to the pistil length as described in Materials and methods. B, tetrad stage; C, early microspore stage; D, end of microspore stage; E, locule of one of the anthers of the bud shown in D, magnified 6× relative to Figure D (bar represents 27 μm); F, bicellular pollen. g, tricellular pollen in anthers at anthesis. In B, C, D, F and G, bars represent 90 μm. H. Anther of a hemizygous plant, at the microspore stage (bar represents 70 μm). I. Ten-day old seedling. J. Open siliques and seeds at two different magnifications.

Discussion

This paper describes a method in order to isolate cDNAs from rapeseed that are preferentially expressed during early male gametophyte development. Expression of several of these genes appears to be highly specific to microspores and we have analysed one of these, called *BnM3.4*, in detail. This gene corresponds to the M3 cDNA isolated, but another cDNA was isolated from the microspore cDNA library using M3 as a probe. This longer cDNA (M3.21) is homologous to M3 except that it shows a deletion of 99 bp in the putative coding region. As these two cDNA cross-hybridize in the hybridization conditions used, we can conclude that at least two genes (the *BnM3* family=*BnM3.4* + related gene(s)) are present in the *B. napus* genome. This is also supported by the results of 5' RACE and Southern blot experiments.

The expression of these genes was studied both by northern blot and *in situ* hybridization. By northern blot analysis, the transcripts were observed mainly in microspores and also in total RNA extracted from buds of length strictly below 2 mm, that contain a majority of tetrads and meiocytes. The developmental synchrony between all the male gametophytes of an anther is not perfect and some free microspores already appear among tetrads in buds below 2 mm, so the hybridization of M3 probe to RNAs from pollen extracted from buds below 2 mm may be due to the early presence of microspores in these buds. This hypothesis was confirmed by *in situ* hybridization experiments. In individual 1.5 mm long buds, where no microspores were found, no signal was detected. On the other hand, in 2.5 mm long buds, where microspores are the only developmental stage present, a strong signal was detected. In later gametogenesis stages, no further signal was detected. According to these results, we can conclude that the homologous genes of *BnM3* family are expressed specifically in the microspore of *B. napus*.

Like the other early-expressed gene isolated from tobacco, *NTM19* (Oldenhof *et al.*, 1996), *BnM3.4* does not show any homology to known genes. Although the deduced *BnM3.4* protein does not show homology with the deduced *NTM19* protein, they are both proline-rich proteins and contain a putative signal peptide. We can only speculate on the function and cellular localisation of the *BnM3.4* protein with the help of prediction programs. Several stamen proteins of unknown function contain similar proline-rich domains (Chen *et al.*, 1993) that, despite differences in amino-acid composition, are structured in a very similar way. The role of the proline-rich motifs is not known, but one may speculate that they serve as some kind of anchoring structures in interaction with either components of the cytoskeleton or with structural components of the cell wall (Woessner *et al.*, 1994; Kröger *et al.*, 1996).

The comparison analysis of the *NTM19* and the *BnM3.4* promoter regions did not show any clear common domains which could indicate a role in the specificity of expression of these genes. Only the box 'tcattt' and its reverse sequence, 'aatga', which has already been shown to be important for pollen-specific expression are present in both promoters. Even if the number and the precise location of these motifs are not conserved between the different promoter regions described (tobacco for *NTM19* and *NTP303*, rapeseed for *Bp10*), functional analysis using deletion and targeted mutagenesis experiments in microprojectile-mediated transient expression assays (Weterings *et al.*, 1995) showed clearly that one of these elements of the *NTP303* promoter constitutes a positive *cis*-regulatory element and functions by specifically enhancing transcription in pollen. This is the reason why we kept this promoter region of 2 kb for the heterologous expression experiments. Both analysis of more microspore-specific genes and promoter deletions using a reporter gene will be necessary to evaluate the influence of the different motifs in the spacial and temporal regulation of transcription of these genes.

The histochemical analysis of *gus* expression driven by the *BnM3.4* promoter (pJD101 construction) in transgenic *A. thaliana* plants showed a high level of GUS activity in male gametophytes but not in other floral and seedling tissues. Furthermore, GUS activity appeared at the microspore stage and stayed at a constant level during pollen development until pollen maturity. GUS being a very stable protein, the detection of GUS activity allowed us to define precisely the start point of *BnM3.4* promoter activity in *A. thaliana* but not its stop point. The spatial and temporal pattern of *gus* expression driven by the *BnM3.4* promoter in *A. thaliana* is in accordance with the established expression pattern of the gene in *B. napus*. These results suggest the presence of *trans*-acting factors in *A. thaliana* able to recognise and interact with the *cis*-regulatory elements of *BnM3.4* in the same manner as in *B. napus*.

Several of the genes isolated by this procedure belong to gene families (*BnM3.4*, *SKP1*-like genes) as seen with other transcriptional approaches (Twell, 1994). This strategy is complementary to the mutagenesis being undertaken in *A. thaliana* (Feldmann *et al.*, 1997; Bonhomme *et al.*, 1999). We now plan to compare the 5'-flanking regions of the other microspore-specific genes we have isolated and to try *BnM3.4* promoter deletion analysis in order to find *cis*-regulatory elements required for microspore-specific expression.

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12/091,896

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/091,896	11/03/2008	Terry R. Wright	DAS-PO129-US-02

CONFIRMATION NO. 6428

PUBLICATION NOTICE

83067
Baker & Daniels LLP- Dow AgroSciences
300 North Meridian Street, Suite 2700
Indianapolis, IN 46204



OC00000049396281

Title:Novel Herbicide Resistance Genes

Publication No.US-2011-0203017-A1

Publication Date:08/18/2011

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The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

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Dear PAIR Customer:

Baker & Daniels LLP- Dow AgroSciences
300 North Meridian Street, Suite 2700
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UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 83067 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

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Application	Document	Mailroom Date	Attorney Docket No.
12091896	NTC.PUB	08/18/2011	DAS-PO129-US-02

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Art Unit : 1616
Applicants : Terry R. Wright, Justin M. Lira, Terence A. Walsh, Donald J. Merlo,
Pon Samuel Jayakumar, Gaofeng Lin.
Attorney ref. : DAS-P0129-US-02
Serial No. : 12/091,896
Conf. No. : 6428
Filed : April 28, 2008.
For : Novel Herbicide Resistance Genes

RESPONSE

In response to the office action dated July 14, 2011, reconsideration is respectfully requested. Please amend the subject application as follows.

In the Specification:

Between paragraphs 37 and 38, please insert the following:

SEQ ID NO:16 provides the sequence of forward primer brjap 5'(speI).

SEQ ID NO:17 provides the sequence of reverse primer br jap 3' (xhoI).

Please replace paragraph 361 (pages 108-109) as follows:

The strain of *Bradyrhizobium japonicum* containing the *AAD-2 (v1)* gene was obtained from Northern Regional Research Laboratory (NRRL, strain #B4450). The lyophilized strain was revived according to NRRL protocol and stored at -80° C in 20% glycerol for internal use as Dow Bacterial strain DB 663. From this freezer stock, a plate of Tryptic Soy Agar was then struck out with a loopful of cells for isolation, and incubated at 28° C for 3 days. A single colony was used to inoculate 100 ml of Tryptic Soy Broth in a 500 ml tri-baffled flask, which was incubated overnight at 28° C on a floor shaker at 150 rpm. From this, total DNA was isolated with the gram negative protocol of Qiagen's DNeasy kit (Qiagen cat. #69504). The following primers were designed to amplify the target gene from genomic DNA, Forward (SEQ ID NO:16): 5' ACT AGT AAC AAA GAA GGA GAT ATA CCA TGA CGA T 3' [(brjap 5'(speI) SEQ ID NO:14 of PCT/US2005/014737 (added Spe I restriction site and Ribosome Binding Site (RBS))] and Reverse (SEQ ID NO:17): 5' TTC TCG AGC TAT CAC TCC GCC GCC TGC TGC TGC 3' [(br jap 3' (xhoI) SEQ ID NO:15 of PCT/US2005/014737 (added a Xho I site)].

In the Claims

89 (currently amended). A plant cell comprising a polynucleotide that encodes a protein having aryloxyalkanoate dioxygenase activity, wherein said protein has at least 95% amino acid sequence identity with a sequence selected from the group consisting of SEQ ID NO:2 and SEQ ID NO:4a~~nucleic acid molecule that encodes said protein hybridizes under stringent conditions with the full complement of a sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3, and SEQ ID NO:5, wherein said stringent conditions comprise 0.2x SSPE at 65° C.~~

90 (previously presented). A plant comprising a plurality of cells of claim 89.

91 (previously presented). A method of controlling weeds in a crop field, said method comprising applying an aryloxyalkanoate herbicide to said crop field, said crop field comprising a plurality of plants, each said plant comprising a plurality of plant cells of claim 89, wherein expression of said polynucleotide renders said plant resistant or tolerant to said aryloxyalkanoate herbicide.

92 (previously presented). The method of claim 91 wherein said aryloxyalkanoate herbicide is 2,4-D.

93 (previously presented). The method of claim 91 wherein said plants are dicots.

94 (previously presented). The method of claim 93 wherein said dicots are soybean plants.

95 (previously presented). The method of claim 91 wherein said method further comprises applying said aryloxyalkanoate herbicide to said crop field prior to planting seeds in said field.

96 (previously presented). The method of claim 91 wherein said method further comprises applying said aryloxyalkanoate herbicide to said crop field after seeds are planted in said field but prior to emergence of said plants grown from said seeds.

97 (previously presented). The method of claim 91 wherein said method further comprises applying glyphosate to said crop field, wherein said plants further comprise a second polynucleotide wherein expression of said second polynucleotide renders said plants resistant or tolerant to glyphosate.

98 (previously presented). The method of claim 91 wherein said method further comprises applying glufosinate to said crop field, wherein said plants further comprise a second polynucleotide wherein expression of said second polynucleotide renders said plants resistant or tolerant to glufosinate.

99 (previously presented). The method of claim 91 wherein said method further comprises applying glyphosate and glufosinate to said crop field, wherein said plants further comprise a second polynucleotide wherein expression of said second polynucleotide renders said plants resistant or tolerant to glyphosate, and wherein said plants further comprise a third polynucleotide wherein expression of said third polynucleotide renders said plants resistant or tolerant to glufosinate.

100 (currently amended). The plant cell of claim 89 wherein said protein has at least 99.85% amino acid sequence identity with SEQ ID NO:2 or SEQ ID NO:4.

101 (previously presented). A seed comprising a plant cell of claim 89.

102 (previously presented). The plant of claim 90 wherein said plant further comprises an insect-resistance gene.

103 (currently amended). ~~A~~ An isolated polynucleotide that encodes a protein having aryloxyalkanoate dioxygenase activity, wherein said protein has at least 95% amino acid sequence identity with a sequence selected from the group consisting of SEQ ID NO:2 and SEQ ID NO:4 ~~a nucleic acid molecule that encodes said protein hybridizes under stringent conditions with the full complement of a sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3, and SEQ ID NO:5, wherein said polynucleotide comprises a codon composition that is optimized for expression in a plant, and wherein said stringent conditions comprise 0.2x SSPE at 65° C.~~

Remarks

Claims 89-103 were the subject of the office action dated July 14, 2011. These claims are again presented for further consideration. Percent identity is now used in place of the hybridization language in claims 89 and 103. Claim 100 is amended accordingly.

The Table on page 106 was already identified in the specification as filed as Table 26 (top left corner of Table).

The two sequences from paragraph 361 (pages 108-109) are now added to the sequence listing and to the Brief Description of the Sequences, as indicated above. No new matter is added.

Claim 103 stands rejected under §101 as being directed to non-statutory subject matter. Although this claim specifies that the polynucleotide "comprises a codon composition that is optimized for expression in a plant" (and is therefore directed to non-naturally occurring subject matter), the term "isolated" is also now added to this claim as suggested by the examiner.

Claims 89-103 stand rejected under §112, first paragraph, as failing the written description requirement. As noted above, for purposes of further clarification, percent identity language is now used in claims 89 and 103 in place of the hybridization language. The examiner did take note of protein sequences SEQ ID NO: 2 and 4 (the latter of which is encoded by one of the optimized genes). Thus, the specification provides species for the claimed genus. Thus, this rejection should be rendered moot.

Claim 103 stands rejected as being anticipated by Schleinitz (September 2004, Applied and Environmental Microbiology 70(9): 5357-5365 / GenBank Accession No. AY327575). Schleinitz relates to bacterial genes. As noted above, claim 103 specified that the claimed polynucleotide "comprises a codon composition that is optimized for expression in a plant." Schleinitz does not teach the use of plant codons to increase expression of those genes. In light of the foregoing, the withdrawal of this rejection is respectfully requested.

Claims 89-94 and 103 stand rejected as being anticipated by U.S. Patent No. 5,608,147 (Kaphammer) "taken with the evidence of" Fourgoux-Nicol (1999, Plant Molecular Biology 40: 857-872). Kaphammer relates to *tfdA*, which shares only about 31% identity with SEQ ID NO:2 (AAD-12). In light of the percent identity ranges specified for purposes of further clarification in claims 89 and 103, this rejection should be moot.

Claims 89-102 stand rejected as being obvious over Kaphammer in view of Schleinitz and U.S. Patent No. 7,250,561 to Pallett. Kaphammer is distinguished above. Pallett is cited as teaching plant transformation in general. The examiner states that it would have thus been obvious to introduce the gene of Schleinitz into a plant with a reasonable expectation of success. The applicants respectfully traverse this rejection.

Example 1 of the subject specification states as follows (emphasis added):

As a way to identify genes which possess herbicide degrading activities *in planta*, it is possible to mine current public databases such as NCBI (National Center for Biotechnology Information). To begin the process, it is necessary to have a functional gene sequence already identified that encodes a protein with the desired characteristics (*i.e.*, α -ketoglutarate dioxygenase activity). This protein sequence is then used as the input for the BLAST (Basic Local Alignment Search Tool) (Altschul *et al.*, 1997) algorithm to compare against available NCBI protein sequences deposited. **Using default settings, this search returns upwards of 100 homologous protein sequences at varying levels. These range from highly identical (85-98%) to very low identity (23-32%) at the amino acid level.** Traditionally only sequences with high homology would be expected to retain similar properties to the input sequence. In this case, only sequences with $\leq 50\%$ homology were chosen. As exemplified herein, cloning and recombinantly expressing homologues with as little as 31% amino acid conservation (relative to *tfdA* from *Ralstonia eutropha*) can be used to impart commercial levels of resistance not only to the intended herbicide, but also to substrates never previously tested with these enzymes.

A single gene (*sdpA*) was identified from the NCBI database (*see* the ncbi.nlm.nih.gov website; accession #AF516752) as a homologue **with only 31% amino acid identity to *tfdA***. Percent identity was determined by first translating both the *sdpA* and *tfdA* DNA sequences deposited in the database to proteins, then using ClustalW in the VectorNTI software package to perform the multiple sequence alignment.

Thus, the gene/protein of SEQ ID NO:2 was selected from many possible options (over 100).

In addition, Example 14 (entitled "Further Evidence of Surprising Results: AAD-12 versus AAD-2") of the subject specification states (with emphasis added):

Another gene was identified from the NCBI database (see the ncbi.nlm.nih.gov website; accession #AP005940) as a homologue with only 44% amino acid identity to *tfdA*. This gene is referred to herein as *AAD-2 (v1)* for consistency. Percent identity was determined by first translating both the *AAD-2* and *tfdA* DNA sequences (SEQ ID NO:12 of PCT/US2005/014737 and GENBANK Accession No. M16730, respectively) to proteins (SEQ ID NO:13 of PCT/US2005/014737 and GENBANK Accession No. M16730, respectively), then using ClustalW in the VectorNTI software package to perform the multiple sequence alignment...

...*AAD-12 (v1)* and *AAD-2 (v1)* did provide detectable 2,4-D resistance versus the transformed and untransformed control lines; however, individual constructs were widely variable in their ability to impart 2,4-D resistance to individual T₁ *Arabidopsis* plants. Surprisingly, *AAD-2 (v1)* and *AAD-2 (v2)* transformants were far less resistant to 2,4-D than the *AAD-12 (v1)* gene, both from a frequency of highly tolerant plants as well as overall average injury. No plants transformed with *AAD-2 (v1)* survived 200 g ae/ha 2,4-D relatively uninjured (<20% visual injury), and overall population injury was about 83% (see PCT/US2005/014737). Conversely, *AAD-12 (v1)* had a population injury average of about 6% when treated with 3,200 g ae/ha 2,4-D (Table 11). Tolerance improved slightly for plant-optimized *AAD-2 (v2)* versus the native gene; however, comparison of both *AAD-12* and *AAD-2* plant optimized genes indicates a significant advantage for *AAD-12 (v1)* in planta.

These results are unexpected given that the *in vitro* comparison of *AAD-2 (v1)* (see PCT/US2005/014737) and *AAD-12 (v2)* indicated both were highly efficacious at degrading 2,4-D and both shared an S-type specificity with respect to chiral aryloxyalkanoate substrates. *AAD-2 (v1)* is expressed in individual T₁ plants to varying levels; however, little protection from 2,4-D injury is afforded by this expressed protein. No substantial difference was evident in protein expression level (*in planta*) for the native and plant optimized *AAD-2* genes (see PCT/US2005/014737). These data corroborate earlier findings that make the functional expression of *AAD-12 (v1)* in *planta*, and resulting herbicide resistance to 2,4-D and pyridyloxyacetate herbicides, unexpected.

Thus, it is clear that the subject *AAD-12* surprisingly performed much better in plants than *AAD-2* (which had little if any activity in plants), even though *AAD-2* had a higher level of identity to the cited *tfdA* gene/protein of Klaphammer.

The above results show that the behavior and activity of a herbicide-tolerance bacterial gene in plants cannot be predicted based on its behavior and activity in bacteria (the *in vitro* results were in *E. coli*). *AAD-2* is more related at the sequence level to the cited *tfdA* than is the subject *AAD-12*. While both genes/proteins were active in bacteria, *AAD-2* was essentially inactive in plants, and the subject *AAD-12* was surprisingly very active in plants.

This shows that herbicidal activity in plants is unpredictable and that the results in bacteria cannot readily be used to predict *in planta* behavior. Again, there were over a

hundred choices to begin with. If AAD-2 were used as a point of reference (again, AAD-2 is *more* related to tfdA at the sequence level than is AAD-12), one would have expected *no* activity in plants for AAD-12.

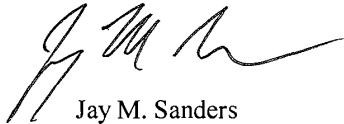
The foregoing should show that there was no reasonable prediction or expectation of successfully producing herbicide-tolerant plants using the subject AAD-12.

In light of these surprising and unexpected results, the withdrawal of this rejection for obviousness is respectfully requested.

The applicants believe that the subject application is in condition for allowance, and such action is respectfully requested. The undersigned invites the examiner to address any remaining issues in a telephone interview to expedite the prosecution of this application.

Any additional fees associated with this Response are hereby authorized to be charged to Baker & Daniels LLP's Deposit Account No. 02-0390.

Respectfully submitted,



Jay M. Sanders
Registration No. 39,355
Phone No.: 317 237 1245
Fax No.: 317 237 1000
Address: 300 N. Meridian Street
Suite 2700
Indianapolis, IN 46204

Date Submitted: October 14, 2011

Attachments: -replacement sequence listing (.txt file)
-Statement regarding replacement sequence listing

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

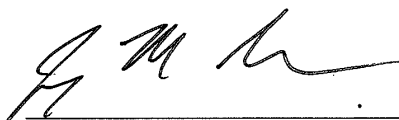
Group Art Unit:	1638	}	Serial No.:	12/091,896
		}		
Atty. Docket:	DAS-P0129-US-02	}	Filed:	November 03, 2008
		}		
Title:	NOVEL HERBICIDE	}	Applicants:	Terry R. Wright, et al.
	RESISTANCE GENES	}		
		}		
Examiner:	David H. Kruse	}		

STATEMENT IN SUPPORT OF REPLACEMENT SEQUENCE SUBMISSION

This Statement accompanies a Response to a non-final Office Action dated July 14, 2011.

Submitted herewith is an electronic copy of a substitute Sequence Listing (in computer readable form; .txt file). SEQ ID NOs: 16 and 17 are added to the substitute Sequence Listing. The sequences contained in SEQ ID NOs: 16 and 17 were disclosed in paragraph [00361] of the specification. Otherwise, the Sequence Listing submitted herewith contains identical sequence information as the originally filed Sequence Listing dated April 28, 2008. No new matter is introduced. Please replace the prior sequence listing with the attached sequence listing.

Respectfully submitted,



Jay M. Sanders, Reg. No. 39,355
Baker & Daniels LLP
300 North Meridian Street, Suite 2700
Indianapolis, Indiana 46204
Telephone: (317) 237-1245

Date Submitted: October 14, 2011

Electronic Acknowledgement Receipt	
EFS ID:	11193607
Application Number:	12091896
International Application Number:	
Confirmation Number:	6428
Title of Invention:	Novel Herbicide Resistance Genes
First Named Inventor/Applicant Name:	Terry R. Wright
Customer Number:	83067
Filer:	Jay M. Sanders/kim richardson
Filer Authorized By:	Jay M. Sanders
Attorney Docket Number:	DAS-PO129-US-02
Receipt Date:	14-OCT-2011
Filing Date:	03-NOV-2008
Time Stamp:	18:13:35
Application Type:	U.S. National Stage under 35 USC 371

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SCORE Placeholder Sheet for IFW Content

Application Number: 12091896

Document Date: 10/14/2011

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

- **Sequence Listing**

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

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- Examiners may access SCORE content via the eDAN interface.
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- External customers may access SCORE content via the Public and Private PAIR interfaces.

Form Revision Date: February 8, 2006

=====
Sequence Listing was accepted.
If you need help call the Patent Electronic Business Center at (866)
217-9197 (toll free).
Reviewer: Anne Corrigan
Timestamp: [year=2011; month=10; day=19; hr=14; min=27; sec=9; ms=84;]
=====

Application No: 12091896 Version No: 2.0

Input Set:

Output Set:

Started: 2011-10-14 18:13:55.949
Finished: 2011-10-14 18:13:57.406
Elapsed: 0 hr(s) 0 min(s) 1 sec(s) 457 ms
Total Warnings: 17
Total Errors: 0
No. of SeqIDs Defined: 17
Actual SeqID Count: 17

Error code	Error Description
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W 402	Undefined organism found in <213> in SEQ ID (3)
W 402	Undefined organism found in <213> in SEQ ID (4)
W 402	Undefined organism found in <213> in SEQ ID (5)
W 213	Artificial or Unknown found in <213> in SEQ ID (6)
W 213	Artificial or Unknown found in <213> in SEQ ID (7)
W 213	Artificial or Unknown found in <213> in SEQ ID (8)
W 213	Artificial or Unknown found in <213> in SEQ ID (9)
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SEQUENCE LISTING

<110> Wright, Terry R.
Lira, Justin M.
Walsh, Terence A.
Merlo, Donald J.
Jayakumar, Pon Samuel
Lin, Gaofeng

<120> Novel Herbicide Resistance Genes

<130> DAS-129XC1

<140> 12091896

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<150> US 60/731,044

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35 40 45

Gln His Leu Ser Asn Asp Gln Gln Ile Thr Phe Ala Lys Arg Phe Gly
50 55 60

Ala Ile Glu Arg Ile Gly Gly Gly Asp Ile Val Ala Ile Ser Asn Val
65 70 75 80

Lys Ala Asp Gly Thr Val Arg Gln His Ser Pro Ala Glu Trp Asp Asp
85 90 95

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Tyr Met Pro Val Met Ala Gln Gly Ala Val Phe Ser Ala Glu Val Val
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180 185 190

Leu Arg Pro Leu Val Lys Val His Pro Glu Thr Gly Arg Pro Ser Leu
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Ser Glu Arg Phe Leu Glu Gly Leu Val Asp Trp Ala Cys Gln Ala Pro
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Arg Val His Ala His Gln Trp Ala Ala Gly Asp Val Val Val Trp Asp
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Asn Arg Cys Leu Leu His Arg Ala Glu Pro Trp Asp Phe Lys Leu Pro
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caacatgcac tcttgatctt ccctgggcaa cacctcagca atgaccaaca gattaccttt 180
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Gly Gln His Leu Ser Asn Asp Gln Gln Ile Thr Phe Ala Lys Arg Phe
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Gly Ala Ile Glu Arg Ile Gly Gly Gly Asp Ile Val Ala Ile Ser Asn
65 70 75 80

Val Lys Ala Asp Gly Thr Val Arg Gln His Ser Pro Ala Glu Trp Asp
85 90 95

Asp Met Met Lys Val Ile Val Gly Asn Met Ala Trp His Ala Asp Ser
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Thr Tyr Met Pro Val Met Ala Gln Gly Ala Val Phe Ser Ala Glu Val
115 120 125

Val Pro Ala Val Gly Gly Arg Thr Cys Phe Ala Asp Met Arg Ala Ala
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Tyr Asp Ala Leu Asp Glu Ala Thr Arg Ala Leu Val His Gln Arg Ser
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Ala Arg His Ser Leu Val Tyr Ser Gln Ser Lys Leu Gly His Val Gln
165 170 175

Gln Ala Gly Ser Ala Tyr Ile Gly Tyr Gly Met Asp Thr Thr Ala Thr
180 185 190

Pro Leu Arg Pro Leu Val Lys Val His Pro Glu Thr Gly Arg Pro Ser
195 200 205

Leu Leu Ile Gly Arg His Ala His Ala Ile Pro Gly Met Asp Ala Ala
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Glu Ser Glu Arg Phe Leu Glu Gly Leu Val Asp Trp Ala Cys Gln Ala
225 230 235 240

Pro Arg Val His Ala His Gln Trp Ala Ala Gly Asp Val Val Val Trp
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Asp Asn Arg Cys Leu Leu His Arg Ala Glu Pro Trp Asp Phe Lys Leu
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83067 e 10/20/2011

Baker & Daniels LLP- Dow AgroSciences
300 North Meridian Street, Suite 2700
Indianapolis, IN 46204

Paper No.

Application No.:	12/091,896	Date Mailed:	10/20/2011
			
First Named Inventor:	Wright, Terry, R.	Examiner:	KRUSE, DAVID H
Attorney Docket No.:	DAS-PO129-US-02	Art Unit:	1638
Confirmation No.:	6428	Filing Date:	11/03/2008

Please find attached an Office communication concerning this application or proceeding.

Commissioner for Patents

PTO-90c (Rev.08-06)

Notice of Non-Compliant Amendment (37 CFR 1.121)	Application No. 12/091,896	Applicant(s) WRIGHT ET AL.	
		Art Unit 3998	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

The amendment document filed on 14 October, 2011 is considered non-compliant because it has failed to meet the requirements of 37 CFR 1.121 or 1.4. In order for the amendment document to be compliant, correction of the following item(s) is required.

THE FOLLOWING MARKED (X) ITEM(S) CAUSE THE AMENDMENT DOCUMENT TO BE NON-COMPLIANT:

- ☐ 1. Amendments to the specification:
 - ☐ A. Amended paragraph(s) do not include markings.
 - ☐ B. New paragraph(s) should not be underlined.
 - ☐ C. Other _____.
- ☐ 2. Abstract:
 - ☐ A. Not presented on a separate sheet. 37 CFR 1.72.
 - ☐ B. Other _____.
- ☐ 3. Amendments to the drawings:
 - ☐ A. The drawings are not properly identified in the top margin as "Replacement Sheet," "New Sheet," or "Annotated Sheet" as required by 37 CFR 1.121(d).
 - ☐ B. The practice of submitting proposed drawing correction has been eliminated. Replacement drawings showing amended figures, without markings, in compliance with 37 CFR 1.84 are required.
 - ☐ C. Other _____.
- ☒ 4. Amendments to the claims:
 - ☒ A. A complete listing of all of the claims is not present.
 - ☐ B. The listing of claims does not include the text of all pending claims (including withdrawn claims)
 - ☐ C. Each claim has not been provided with the proper status identifier, and as such, the individual status of each claim cannot be identified. Note: the status of every claim must be indicated after its claim number by using one of the following status identifiers: (Original), (Currently amended), (Canceled), (Previously presented), (New), (Not entered), (Withdrawn) and (Withdrawn-currently amended).
 - ☐ D. The claims of this amendment paper have not been presented in ascending numerical order.
 - ☒ E. Other: 1-88 missing.
- ☐ 5. Other (e.g., the amendment is unsigned or not signed in accordance with 37 CFR 1.4): For further explanation of the amendment format required by 37 CFR 1.121, see MPEP § 714.

TIME PERIODS FOR FILING A REPLY TO THIS NOTICE:

1. Applicant is given **no new time period** if the non-compliant amendment is an after-final amendment or an amendment filed after allowance, or a drawing submission (only) If applicant wishes to resubmit the non-compliant after-final amendment with corrections, the **entire corrected amendment** must be resubmitted.
2. Applicant is given **one month**, or thirty (30) days, whichever is longer, from the mail date of this notice to supply the correction, if the non-compliant amendment is one of the following: a preliminary amendment, a non-final amendment (including a submission for a request for continued examination (RCE) under 37 CFR 1.114), a supplemental amendment filed within a suspension period under 37 CFR 1.103(a) or (c), and an amendment filed in response to a Quayle action. If any of above boxes 1 to 4 are checked, the correction required is only the corrected section of the non-compliant amendment in compliance with 37 CFR 1.121.

Extensions of time are available under 37 CFR 1.136(a) only if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action.

Failure to timely respond to this notice will result in:

- Abandonment** of the application if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action; or
- Non-entry** of the amendment if the non-compliant amendment is a preliminary amendment or supplemental amendment.

Legal Instruments Examiner (LIE), if applicable /JACQUELINE COUPLIN/ Telephone No: (571)272-7245

To: inteias@bakerd.com,cynthia.payson@bakerd.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 83067

Oct 21, 2011 05:27:45 AM

Dear PAIR Customer:

Baker & Daniels LLP- Dow AgroSciences
300 North Meridian Street, Suite 2700
Indianapolis, IN 46204
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 83067 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:

The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
12091896	NTC.A.NONCPL	10/20/2011	DAS-PO129-US-02

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If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Art Unit : 1616
Applicants : Terry R. Wright, Justin M. Lira, Terence A. Walsh, Donald J. Merlo,
Pon Samuel Jayakumar, Gaofeng Lin.
Attorney ref. : DAS-P0129-US-02
Serial No. : 12/091,896
Conf. No. : 6428
Filed : April 28, 2008.
For : Novel Herbicide Resistance Genes

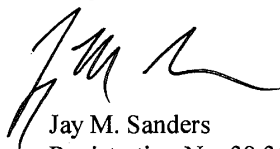
RESPONSE TO NOTICE OF NON-COMPLIANT AMENDMENT

In response to the Notice dated October 20, 2011, attached is a replacement page 3 for the Response dated October 14, 2011. The attached replacement page provides the status (canceled) of claims 1-88. The attached page is otherwise identical to page 3 of the Response filed on October 14, 2011. Entry of that Response, with the corrected page, is hereby requested.

The undersigned invites the examiner to call the undersigned to address any remaining issues.

Any fees associated with this Response are hereby authorized to be charged to Baker & Daniels LLP's Deposit Account No. 02-0390.

Respectfully submitted,



Jay M. Sanders
Registration No. 39,355
Phone No.: 317 237 1245
Fax No.: 317 237 1000
Address: 300 N. Meridian Street
Suite 2700
Indianapolis, IN 46204

Date Submitted: November 18, 2011

Attachment: replacement page 3 for Response dated October 14, 2011

In the Claims

1-88 (canceled).

89 (currently amended). A plant cell comprising a polynucleotide that encodes a protein having aryloxyalkanoate dioxygenase activity, wherein said protein has at least 95% amino acid sequence identity with a sequence selected from the group consisting of SEQ ID NO:2 and SEQ ID NO:4a ~~nucleic acid molecule that encodes said protein hybridizes under stringent conditions with the full complement of a sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3, and SEQ ID NO:5, wherein said stringent conditions comprise 0.2x SSPE at 65° C.~~

90 (previously presented). A plant comprising a plurality of cells of claim 89.

91 (previously presented). A method of controlling weeds in a crop field, said method comprising applying an aryloxyalkanoate herbicide to said crop field, said crop field comprising a plurality of plants, each said plant comprising a plurality of plant cells of claim 89, wherein expression of said polynucleotide renders said plant resistant or tolerant to said aryloxyalkanoate herbicide.

92 (previously presented). The method of claim 91 wherein said aryloxyalkanoate herbicide is 2,4-D.

93 (previously presented). The method of claim 91 wherein said plants are dicots.

94 (previously presented). The method of claim 93 wherein said dicots are soybean plants.

95 (previously presented). The method of claim 91 wherein said method further comprises applying said aryloxyalkanoate herbicide to said crop field prior to planting seeds in said field.

96 (previously presented). The method of claim 91 wherein said method further comprises applying said aryloxyalkanoate herbicide to said crop field after seeds are planted in said field but prior to emergence of said plants grown from said seeds.

Electronic Acknowledgement Receipt	
EFS ID:	11439789
Application Number:	12091896
International Application Number:	
Confirmation Number:	6428
Title of Invention:	Novel Herbicide Resistance Genes
First Named Inventor/Applicant Name:	Terry R. Wright
Customer Number:	83067
Filer:	Jay M. Sanders/Lisa Schodrowski
Filer Authorized By:	Jay M. Sanders
Attorney Docket Number:	DAS-PO129-US-02
Receipt Date:	18-NOV-2011
Filing Date:	03-NOV-2008
Time Stamp:	13:51:18
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Supplemental Response or Supplemental Amendment	DAS-PO129-US-02-NonCompliant0.PDF	22988 a85e4713428acebc25a99928e979321f62234580	no	2

Warnings:

Information:

Total Files Size (in bytes):	22988
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.	



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/091,896	11/03/2008	Terry R. Wright	DAS-PO129-US-02	6428
83067 7590 12/27/2011 Baker & Daniels LLP- Dow AgroSciences 300 North Meridian Street, Suite 2700 Indianapolis, IN 46204			EXAMINER KRUSE, DAVID H	
			ART UNIT 1638	PAPER NUMBER
			NOTIFICATION DATE 12/27/2011	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

intcas@bakerd.com
cynthia.payson@bakerd.com

Notice of Non-Compliant Amendment (37 CFR 1.121)	Application No.	Applicant(s)
	12/091,896	WRIGHT ET AL.
	Examiner	Art Unit
	DAVID H. KRUSE	1638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

The amendment document filed on 18 November 2011 is considered non-compliant because it has failed to meet the requirements of 37 CFR 1.121 or 1.4. In order for the amendment document to be compliant, correction of the following item(s) is required.

THE FOLLOWING MARKED (X) ITEM(S) CAUSE THE AMENDMENT DOCUMENT TO BE NON-COMPLIANT:

- ☐ 1. Amendments to the specification:
 - ☐ A. Amended paragraph(s) do not include markings.
 - ☐ B. New paragraph(s) should not be underlined.
 - ☐ C. Other _____.
- ☐ 2. Abstract:
 - ☐ A. Not presented on a separate sheet. 37 CFR 1.72.
 - ☐ B. Other _____.
- ☐ 3. Amendments to the drawings:
 - ☐ A. The drawings are not properly identified in the top margin as "Replacement Sheet," "New Sheet," or "Annotated Sheet" as required by 37 CFR 1.121(d).
 - ☐ B. The practice of submitting proposed drawing correction has been eliminated. Replacement drawings showing amended figures, without markings, in compliance with 37 CFR 1.84 are required.
 - ☐ C. Other _____.
- ☒ 4. Amendments to the claims:
 - ☒ A. A complete listing of all of the claims is not present.
 - ☐ B. The listing of claims does not include the text of all pending claims (including withdrawn claims)
 - ☐ C. Each claim has not been provided with the proper status identifier, and as such, the individual status of each claim cannot be identified. Note: the status of every claim must be indicated after its claim number by using one of the following status identifiers: (Original), (Currently amended), (Canceled), (Previously presented), (New), (Not entered), (Withdrawn) and (Withdrawn-currently amended).
 - ☐ D. The claims of this amendment paper have not been presented in ascending numerical order.
 - ☒ E. Other: claims 97-103 missing.
- ☐ 5. Other (e.g., the amendment is unsigned or not signed in accordance with 37 CFR 1.4):

For further explanation of the amendment format required by 37 CFR 1.121, see MPEP § 714.

TIME PERIODS FOR FILING A REPLY TO THIS NOTICE:

1. Applicant is given **no new time period** if the non-compliant amendment is an after-final amendment or an amendment filed after allowance. If applicant wishes to resubmit the non-compliant after-final amendment with corrections, the **entire corrected amendment** must be resubmitted.
2. Applicant is given **one month**, or thirty (30) days, whichever is longer, from the mail date of this notice to supply the correction, if the non-compliant amendment is one of the following: a preliminary amendment, a non-final amendment (including a submission for a request for continued examination (RCE) under 37 CFR 1.114), a supplemental amendment filed within a suspension period under 37 CFR 1.103(a) or (c), and an amendment filed in response to a *Quayle* action. If any of above boxes 1. to 4. are checked, the correction required is only the **corrected section** of the non-compliant amendment in compliance with 37 CFR 1.121.

Extensions of time are available under 37 CFR 1.136(a) only if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action.

Failure to timely respond to this notice will result in:

- Abandonment** of the application if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action; or
- Non-entry** of the amendment if the non-compliant amendment is a preliminary amendment or supplemental amendment.

/DAVID H KRUSE/ Primary Examiner, Art Unit 1638	
--	--

To: inteias@bakerd.com,cynthia.payson@bakerd.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 83067

Dec 27, 2011 05:25:01 AM

Dear PAIR Customer:

Baker & Daniels LLP- Dow AgroSciences
300 North Meridian Street, Suite 2700
Indianapolis, IN 46204
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 83067 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

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The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
12091896	NTC.A.NONCPL	12/27/2011	DAS-PO129-US-02

To view your correspondence online or update your email addresses, please visit us anytime at <https://sportal.uspto.gov/secure/myportal/privatepair>.

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Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Art Unit : 1616
Applicants : Terry R. Wright, Justin M. Lira, Terence A. Walsh, Donald J. Merlo,
Pon Samuel Jayakumar, Gaofeng Lin.
Attorney ref. : DAS-P0129-US-02
Serial No. : 12/091,896
Conf. No. : 6428
Filed : April 28, 2008.
For : Novel Herbicide Resistance Genes

RESPONSE TO NOTICE OF NON-COMPLIANT AMENDMENT

In response to the Notice dated December 27, 2011, attached is a complete set of claims with the status identifiers – corresponding to pages 3-4 of the Response dated October 14, 2011.

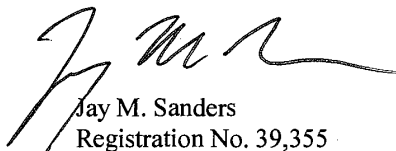
The claim set filed with the Response dated October 14, 2011, did not include the status (canceled) of claims 1-88. The response (filed November 18, 2011) to the Notice of non-compliant amendment dated October 20, 2011, included only a replacement page 3 – providing "only the corrected section" as stated in section 2 of that Notice. This page 3 included the status of claims 1-88.

The Notice of non-compliant amendment dated December 27, 2011, indicated that a complete listing of all claims was not present; claims 97-103 were indicated to be missing. Claims 97-103 were on page 4 of the Response dated October 14, 2011.

Thus, pages 3-4 are now attached - corresponding to pages 3-4 for the Response dated October 14, 2011. The attached replacement pages provide the complete set of claims, including claims 97-103, and the status (canceled) of claims 1-88. Aside from the status identifiers, the attached page 3 is otherwise identical to page 3 of the Response filed on October 14, 2011. Page 4 is identical. Entry of that Response, with the claim set attached hereto, is hereby requested.

Any fees associated with this Response are hereby authorized to be charged to
Baker & Daniels LLP's Deposit Account No. 02-0390.

Respectfully submitted,



Jay M. Sanders
Registration No. 39,355
Phone No.: 317 237 1245
Fax No.: 317 237 1000
Address: 300 N. Meridian Street
Suite 2700
Indianapolis, IN 46204

Date Submitted: January 25, 2012

Attachment: pages 3-4 for Response dated October 14, 2011

In the Claims

1-88 (canceled).

89 (currently amended). A plant cell comprising a polynucleotide that encodes a protein having aryloxyalkanoate dioxygenase activity, wherein said protein has at least 95% amino acid sequence identity with a sequence selected from the group consisting of SEQ ID NO:2 and SEQ ID NO:4a ~~nucleic acid molecule that encodes said protein hybridizes under stringent conditions with the full complement of a sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3, and SEQ ID NO:5, wherein said stringent conditions comprise 0.2x SSPE at 65° C.~~

90 (previously presented). A plant comprising a plurality of cells of claim 89.

91 (previously presented). A method of controlling weeds in a crop field, said method comprising applying an aryloxyalkanoate herbicide to said crop field, said crop field comprising a plurality of plants, each said plant comprising a plurality of plant cells of claim 89, wherein expression of said polynucleotide renders said plant resistant or tolerant to said aryloxyalkanoate herbicide.

92 (previously presented). The method of claim 91 wherein said aryloxyalkanoate herbicide is 2,4-D.

93 (previously presented). The method of claim 91 wherein said plants are dicots.

94 (previously presented). The method of claim 93 wherein said dicots are soybean plants.

95 (previously presented). The method of claim 91 wherein said method further comprises applying said aryloxyalkanoate herbicide to said crop field prior to planting seeds in said field.

96 (previously presented). The method of claim 91 wherein said method further comprises applying said aryloxyalkanoate herbicide to said crop field after seeds are planted in said field but prior to emergence of said plants grown from said seeds.

97 (previously presented). The method of claim 91 wherein said method further comprises applying glyphosate to said crop field, wherein said plants further comprise a second polynucleotide wherein expression of said second polynucleotide renders said plants resistant or tolerant to glyphosate.

98 (previously presented). The method of claim 91 wherein said method further comprises applying glufosinate to said crop field, wherein said plants further comprise a second polynucleotide wherein expression of said second polynucleotide renders said plants resistant or tolerant to glufosinate.

99 (previously presented). The method of claim 91 wherein said method further comprises applying glyphosate and glufosinate to said crop field, wherein said plants further comprise a second polynucleotide wherein expression of said second polynucleotide renders said plants resistant or tolerant to glyphosate, and wherein said plants further comprise a third polynucleotide wherein expression of said third polynucleotide renders said plants resistant or tolerant to glufosinate.

100 (currently amended). The plant cell of claim 89 wherein said protein has at least 9985% amino acid sequence identity with SEQ ID NO:2 or SEQ ID NO:4.

101 (previously presented). A seed comprising a plant cell of claim 89.

102 (previously presented). The plant of claim 90 wherein said plant further comprises an insect-resistance gene.

103 (currently amended). ~~A~~An isolated polynucleotide that encodes a protein having aryloxyalkanoate dioxygenase activity, wherein said protein has at least 95% amino acid sequence identity with a sequence selected from the group consisting of SEQ ID NO:2 and SEQ ID NO:4~~a nucleic acid molecule that encodes said protein hybridizes under stringent conditions with the full complement of a sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3, and SEQ ID NO:5, wherein said polynucleotide comprises a codon composition that is optimized for expression in a plant, and wherein said stringent conditions comprise 0.2x SSPE at 65° C.~~

Electronic Acknowledgement Receipt	
EFS ID:	11916739
Application Number:	12091896
International Application Number:	
Confirmation Number:	6428
Title of Invention:	Novel Herbicide Resistance Genes
First Named Inventor/Applicant Name:	Terry R. Wright
Customer Number:	83067
Filer:	Jay M. Sanders/Lisa Schodrowski
Filer Authorized By:	Jay M. Sanders
Attorney Docket Number:	DAS-PO129-US-02
Receipt Date:	25-JAN-2012
Filing Date:	03-NOV-2008
Time Stamp:	15:16:59
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Response-NonComplian0.PDF	44363 48c11bd5ec5c5111b09a5768449a0a71748e400c	yes	4

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Supplemental Response or Supplemental Amendment	1	2
	Claims	3	4
Warnings:			
Information:			
Total Files Size (in bytes):		44363	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.			

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 12/091,896	Filing Date 11/03/2008	☐ To be Mailed
APPLICATION AS FILED – PART I							
(Column 1)		(Column 2)		SMALL ENTITY ☐ OR		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (j), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =		OR	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =			X \$ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	
APPLICATION AS AMENDED – PART II							
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY OR OTHER THAN SMALL ENTITY	
AMENDMENT	01/25/2012	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0	X \$ =	OR X \$60= 0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X \$ =	OR X \$250= 0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	OR	TOTAL ADD'L FEE 0
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY OR OTHER THAN SMALL ENTITY	
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =	OR X \$ =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =	OR X \$ =
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	OR	TOTAL ADD'L FEE
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.							

Legal Instrument Examiner:
/ERIC DAVIS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/091,896	11/03/2008	Terry R. Wright	DAS-PO129-US-02	6428
83067	7590	03/27/2012		
Faegre Baker Daniels LLP- Dow AgroSciences 300 North Meridian Street, Suite 2700 Indianapolis, IN 46204			EXAMINER KRUSE, DAVID H	
			ART UNIT 1638	PAPER NUMBER
			NOTIFICATION DATE 03/27/2012	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

intcas@faegrebd.com
cynthia.payson@faegrebd.com

Office Action Summary	Application No.	Applicant(s)	
	12/091,896	WRIGHT ET AL.	
	Examiner	Art Unit	
	DAVID H. KRUSE	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on 14 October 2011 and 25 January 2012.

2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.

3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.

4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5) ☒ Claim(s) 89-103 is/are pending in the application.

5a) Of the above claim(s) ____ is/are withdrawn from consideration.

6) ☒ Claim(s) 89-102 is/are allowed.

7) ☒ Claim(s) 103 is/are rejected.

8) ☐ Claim(s) ____ is/are objected to.

9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

10) ☒ The specification is objected to by the Examiner.

11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. ____.
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)	5) ☐ Notice of Informal Patent Application
Paper No(s)/Mail Date ____.	6) ☐ Other: ____.

DETAILED ACTION

1. This Office action is in response to the Amendment filed 25 January 2012 and Remarks filed on 14 October 2011.
2. The specification is now in compliance with the Sequence Rules.
3. The rejection under 35 U.S.C. 101 is withdrawn in view of Applicants' amendment to claim 103.
4. The rejection under 35 U.S.C. 112, first paragraph, for lack of adequate written description is withdrawn in view of Applicants' amendments to the claims.
5. The rejection of claims 89-94 and 103 under 35 U.S.C. 102(b) as being anticipated by Kaphammer (U.S. Patent 5,608,147) taken with the evidence of Fourgoux-Nicol *et al* (1999, Plant Molecular Biology 40: 857-872) is withdrawn in view of Applicants' amendments to the claims.
6. The rejection of claim 89-102 under 35 U.S.C. 103(a) is withdrawn in view of Applicants' amendments to the claims and arguments as directed to the claims as presently amended.

Specification

7. The disclosure remains objected to because of the following informalities: On page 106 there is a Table that lacks a table number, subsequent Tables would need to be renumbered and the specification amended to reflect the renumbering of Tables. Applicants argue that the table on page 106 was already identified in the specification as filed as Table 26 at the top left corner of [the] table (page 5, 2nd paragraph of the

Remarks). The specification of record has a Table 26 on page 105, the table on page 106 does not have a number.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claim 103 remains rejected under 35 U.S.C. § 102(b) as being anticipated by Schleinitz *et al* (September 2004, Applied and Environmental Microbiology 70(9): 5357-5365). This rejection is repeated for the reason of record as set forth in the last Office action mailed 14 July 2011. Applicant's arguments filed 14 October 2011 have been fully considered but they are not persuasive.

Schleinitz *et al* disclose an isolated polynucleotide comprising instant SEQ ID NO: 1 at GenBank accession number AY327575 (page 5359, right column, 5th paragraph). The encoded protein (see FIG 2 on page 5360) would inherently have aryloxyalkanoate dioxygenase activity. Hence, the claim limitation had been previously disclosed.

Applicants argue that Schleinitz relates to bacterial genes. Applicants argue that claim 103 specified that the claimed polynucleotide "comprises a codon composition that is optimized for expression in a plant." Applicants argue that Schleinitz does not teach the use of plant codons to increase expression of those genes (page 5, 6th

Art Unit: 1638

paragraph of the Remarks). This argument is not found to be persuasive because the claim fails to set forth any specific structure that would obviate a finding of anticipation. Since plant plastids will readily express bacterial genes, the limitation "optimized for expression in a plant" as presently stated has no patentable weight in the instant case. The prior art protein has a first amino acid methionine, and the protein sequence would anticipate all of the coding sequences that would produce it since one skilled in the art could readily envision them.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Claim 103 remains rejected.

12. Claims 89-102 are allowed.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David H. Kruse, Ph.D. whose telephone number is (571)

Art Unit: 1638

272-0799. The examiner can normally be reached on Monday to Friday from 8:00 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached at (571) 272-0975. The central FAX number for official correspondence is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group Receptionist whose telephone number is (571) 272-1600.

/David H Kruse/
Primary Examiner, Art Unit 1638

Search Notes 	Application/Control No. 12091896	Applicant(s)/Patent Under Reexamination WRIGHT ET AL.
	Examiner DAVID H KRUSE	Art Unit 1638

SEARCHED			
Class	Subclass	Date	Examiner
EAST	EAST	7/8/2011	/DK/

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor Name Search	7/8/2011	/DK/
EAST: USPAT, USPGPUB, EPO, JPO, DERWENT	7/8/2011	/DK/
STN: AGRICOLA, BIOSIS, EMBASE, CAPLUS	7/8/2011	/DK/
Sequence Search including interference Id NOs: 1-6	6/3/2011	/DK/
Update EAST	3/22/2012	/DK/

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

	/DAVID H KRUSE/ Primary Examiner.Art Unit 1638
--	---

EAST Search History**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	7	Delftia and sdpA	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/03/22 14:38
L2	821	dioxygenase and "2,4-D"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/03/22 14:41
L3	248	l2 and herbicide.clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/03/22 14:41

EAST Search History (Interference)

< This search history is empty >

3/ 22/ 2012 2:41:47 PM**C:\Users\dkruse\Documents\EAST\Workspaces\12091896.wsp**

To: inteas@faegrebd.com,cynthia.payson@faegrebd.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 83067

Mar 27, 2012 08:49:58 AM

Dear PAIR Customer:

Faegre Baker Daniels LLP- Dow AgroSciences
300 North Meridian Street, Suite 2700
Indianapolis, IN 46204
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 83067 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

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Application	Document	Mailroom Date	Attorney Docket No.
12091896	CTFR	03/27/2012	DAS-PO129-US-02

To view your correspondence online or update your email addresses, please visit us anytime at <https://sportal.uspto.gov/secure/myportal/privatepair>.

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Thank you for prompt attention to this notice,

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PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

May 29, 2012

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Art Unit : 1616
Applicants : Terry R. Wright, Justin M. Lira, Terence A. Walsh, Donald J. Merlo,
Pon Samuel Jayakumar, Gaofeng Lin.
Attorney ref. : DAS-P0129-US-02
Serial No. : 12/091,896
Conf. No. : 6428
Filed : April 28, 2008.
For : Novel Herbicide Resistance Genes

RESPONSE

In response to the final office action dated March 27, 2012, reconsideration is respectfully requested. Please amend the subject application as follows.

In the Specification:

After paragraph 353, and above the table on page 106, please insert the following:

Table 26.b.

In the Claims

1-88 (canceled).

89 (previously presented). A plant cell comprising a polynucleotide that encodes a protein having aryloxyalkanoate dioxygenase activity, wherein said protein has at least 95% amino acid sequence identity with a sequence selected from the group consisting of SEQ ID NO:2 and SEQ ID NO:4.

90 (previously presented). A plant comprising a plurality of cells of claim 89.

91 (previously presented). A method of controlling weeds in a crop field, said method comprising applying an aryloxyalkanoate herbicide to said crop field, said crop field comprising a plurality of plants, each said plant comprising a plurality of plant cells of claim 89, wherein expression of said polynucleotide renders said plant resistant or tolerant to said aryloxyalkanoate herbicide.

92 (previously presented). The method of claim 91 wherein said aryloxyalkanoate herbicide is 2,4-D.

93 (previously presented). The method of claim 91 wherein said plants are dicots.

94 (previously presented). The method of claim 93 wherein said dicots are soybean plants.

95 (previously presented). The method of claim 91 wherein said method further comprises applying said aryloxyalkanoate herbicide to said crop field prior to planting seeds in said field.

96 (previously presented). The method of claim 91 wherein said method further comprises applying said aryloxyalkanoate herbicide to said crop field after seeds are planted in said field but prior to emergence of said plants grown from said seeds.

97 (previously presented). The method of claim 91 wherein said method further comprises applying glyphosate to said crop field, wherein said plants further comprise a second polynucleotide wherein expression of said second polynucleotide renders said plants resistant or tolerant to glyphosate.

98 (previously presented). The method of claim 91 wherein said method further comprises applying glufosinate to said crop field, wherein said plants further comprise a second polynucleotide wherein expression of said second polynucleotide renders said plants resistant or tolerant to glufosinate.

99 (previously presented). The method of claim 91 wherein said method further comprises applying glyphosate and glufosinate to said crop field, wherein said plants further comprise a second polynucleotide wherein expression of said second polynucleotide renders said plants resistant or tolerant to glyphosate, and wherein said plants further comprise a third polynucleotide wherein expression of said third polynucleotide renders said plants resistant or tolerant to glufosinate.

100 (previously presented). The plant cell of claim 89 wherein said protein has at least 99% amino acid sequence identity with SEQ ID NO:2 or SEQ ID NO:4.

101 (previously presented). A seed comprising a plant cell of claim 89.

102 (previously presented). The plant of claim 90 wherein said plant further comprises an insect-resistance gene.

103 (canceled).

Remarks

Claims 89-103 were the subject of the final office action dated March 27, 2012. The applicants wish to thank the examiner for indicating that claims 89-102 are allowable.

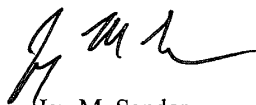
The Table on page 106 is now numbered.

Claim 103 stands rejected as being anticipated by Schleinitz (September 2004, Applied and Environmental Microbiology 70(9): 5357-5365 / GenBank Accession No. AY327575). Although the applicants do not agree with this rejection, claim 103 is canceled without prejudice to expedite the allowance of all of the other claims.

The applicants believe that the subject application is in condition for allowance, and such action is respectfully requested.

Any additional fees associated with this Response are hereby authorized to be charged to Faegre Baker Daniels LLP's Deposit Account No. 02-0390.

Respectfully submitted,



Jay M. Sanders
Registration No. 39,355
Phone No.: 317 237 1245
Fax No.: 317 237 1000
Address: 300 N. Meridian Street
Suite 2700
Indianapolis, IN 46204

Date Submitted: May 29, 2012

Electronic Acknowledgement Receipt	
EFS ID:	12881415
Application Number:	12091896
International Application Number:	
Confirmation Number:	6428
Title of Invention:	Novel Herbicide Resistance Genes
First Named Inventor/Applicant Name:	Terry R. Wright
Customer Number:	83067
Filer:	Jay M. Sanders/Lisa Schodrowski
Filer Authorized By:	Jay M. Sanders
Attorney Docket Number:	DAS-PO129-US-02
Receipt Date:	29-MAY-2012
Filing Date:	03-NOV-2008
Time Stamp:	16:54:02
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		DAS-P0129-Response.PDF	32723 c14ee8deccabf06279f7943695c35709653e1ec0	yes	5

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Applicant Arguments/Remarks Made in an Amendment	1	1
	Specification	2	2
	Claims	3	4
	Applicant Arguments/Remarks Made in an Amendment	5	5
Warnings:			
Information:			
Total Files Size (in bytes):		32723	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.			

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 12/091,896	Filing Date 11/03/2008	☐ To be Mailed
APPLICATION AS FILED – PART I							
(Column 1)		(Column 2)		SMALL ENTITY ☐ OR		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (j), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =		OR	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =			X \$ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	
APPLICATION AS AMENDED – PART II							
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY OR OTHER THAN SMALL ENTITY	
AMENDMENT	05/29/2012	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 14	Minus	** 20	= 0	X \$ =	OR X \$60= 0
	Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X \$ =	OR X \$250= 0
☐ Application Size Fee (37 CFR 1.16(s))							
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
						TOTAL ADD'L FEE	OR TOTAL ADD'L FEE 0
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY OR OTHER THAN SMALL ENTITY	
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =	OR X \$ =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =	OR X \$ =
☐ Application Size Fee (37 CFR 1.16(s))							
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
						TOTAL ADD'L FEE	OR TOTAL ADD'L FEE
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.							

Legal Instrument Examiner:
/FLORENCE PATTERSON/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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NOTICE OF ALLOWANCE AND FEE(S) DUE

83067 7590 06/11/2012
Faegre Baker Daniels LLP- Dow AgroSciences
300 North Meridian Street, Suite 2700
Indianapolis, IN 46204

EXAMINER

KRUSE, DAVID H

ART UNIT

PAPER NUMBER

1638

DATE MAILED: 06/11/2012

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/091,896	11/03/2008	Terry R. Wright	DAS-PO129-US-02	6428

TITLE OF INVENTION: NOVEL HERBICIDE RESISTANCE GENES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1740	\$300	\$0	\$2040	09/11/2012

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

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Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE
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P.O. Box 1450
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CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

83067 7590 06/11/2012
Faegre Baker Daniels LLP- Dow AgroSciences
300 North Meridian Street, Suite 2700
Indianapolis, IN 46204

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(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/091,896	11/03/2008	Terry R. Wright	DAS-PO129-US-02	6428

TITLE OF INVENTION: NOVEL HERBICIDE RESISTANCE GENES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1740	\$300	\$0	\$2040	09/11/2012

EXAMINER	ART UNIT	CLASS-SUBCLASS
KRUSE, DAVID H	1638	800-300000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/091,896	11/03/2008	Terry R. Wright	DAS-PO129-US-02	6428
83067 7590 06/11/2012 Faegre Baker Daniels LLP- Dow AgroSciences 300 North Meridian Street, Suite 2700 Indianapolis, IN 46204			EXAMINER KRUSE, DAVID H	
			ART UNIT 1638	PAPER NUMBER

DATE MAILED: 06/11/2012

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 454 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 454 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No.	Applicant(s)	
	12/091,896	WRIGHT ET AL.	
	Examiner	Art Unit	
	DAVID H. KRUSE	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the Amendment filed on 29 May 2012.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are 89-102.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892) 2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948) 3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____ 4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material	5. ☐ Notice of Informal Patent Application 6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ 7. ☐ Examiner's Amendment/Comment 8. ☐ Examiner's Statement of Reasons for Allowance 9. ☐ Other _____.
--	---

/DAVID H KRUSE/ Primary Examiner, Art Unit 1638	
--	--

<i>Index of Claims</i> 	Application/Control No. 12091896	Applicant(s)/Patent Under Reexamination WRIGHT ET AL.
	Examiner DAVID H KRUSE	Art Unit 1638

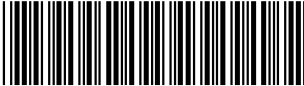
✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☒ Claims renumbered in the same order as presented by applicant											☐ CPA		☐ T.D.		☐ R.1.47	
CLAIM			DATE													
Final	Original	05/31/2012														
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<i>Index of Claims</i> 	Application/Control No. 12091896	Applicant(s)/Patent Under Reexamination WRIGHT ET AL.
	Examiner DAVID H KRUSE	Art Unit 1638

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☒ Claims renumbered in the same order as presented by applicant											☐ CPA		☐ T.D.		☐ R.1.47	
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<i>Index of Claims</i> 	Application/Control No. 12091896	Applicant(s)/Patent Under Reexamination WRIGHT ET AL.
	Examiner DAVID H KRUSE	Art Unit 1638

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☒ Claims renumbered in the same order as presented by applicant											☐ CPA		☐ T.D.		☐ R.1.47	
CLAIM			DATE													
Final	Original	05/31/2012														
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12	100	=														
13	101	=														
14	102	=														
	103	-														

OK TO ENTER: /DK/ (05/31/2012)

May 29, 2012

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Art Unit : 1616
Applicants : Terry R. Wright, Justin M. Lira, Terence A. Walsh, Donald J. Merlo,
Pon Samuel Jayakumar, Gaofeng Lin.
Attorney ref. : DAS-P0129-US-02
Serial No. : 12/091,896
Conf. No. : 6428
Filed : April 28, 2008.
For : Novel Herbicide Resistance Genes

RESPONSE

In response to the final office action dated March 27, 2012, reconsideration is respectfully requested. Please amend the subject application as follows.

Search Notes 	Application/Control No. 12091896	Applicant(s)/Patent Under Reexamination WRIGHT ET AL.
	Examiner DAVID H KRUSE	Art Unit 1638

SEARCHED			
Class	Subclass	Date	Examiner
EAST	EAST	7/8/2011	/DK/

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor Name Search	7/8/2011	/DK/
EAST: USPAT, USPGPUB, EPO, JPO, DERWENT	7/8/2011	/DK/
STN: AGRICOLA, BIOSIS, EMBASE, CAPLUS	7/8/2011	/DK/
Sequence Search including interference Id NOs: 1-6	6/3/2011	/DK/
Update EAST	3/22/2012	/DK/
Update EAST	5/31/2012	/DK/

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
EAST	EAST	5/31/2012	/DK/

	/DAVID H KRUSE/ Primary Examiner.Art Unit 1638
--	---

EAST Search History**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	7	Delftia and sdpA	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/05/31 14:49
S1	7	Delftia and sdpA	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/03/22 14:38
S2	821	dioxygenase and "2,4-D"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/03/22 14:41
S3	248	S2 and herbicide.clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/03/22 14:41

EAST Search History (Interference)

< This search history is empty >

5/ 31/ 2012 2:50:20 PM**C:\ Users\ dkruse\ Documents\ EAST\ Workspaces\ 12091896.wsp**

Issue Classification 	Application/Control No. 12091896	Applicant(s)/Patent Under Reexamination WRIGHT ET AL.
	Examiner DAVID H KRUSE	Art Unit 1638

ORIGINAL						INTERNATIONAL CLASSIFICATION														
CLASS		SUBCLASS				CLAIMED					NON-CLAIMED									
800		300				C	1	2	N	15 / 82 (2006.01.01)										
CROSS REFERENCE(S)																				
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)																			
435	419																			
800	298	302																		

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE		Total Claims Allowed:	
		14	
(Assistant Examiner)	(Date)		
/DAVID H KRUSE/ Primary Examiner.Art Unit 1638	05/31/2012	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	NONE

To: inteas@faegrebd.com,cynthia.payson@faegrebd.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 83067

Jun 11, 2012 05:29:10 AM

Dear PAIR Customer:

Faegre Baker Daniels LLP- Dow AgroSciences
300 North Meridian Street, Suite 2700
Indianapolis, IN 46204
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 83067 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:

The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
12091896	NOA	06/11/2012	DAS-PO129-US-02

To view your correspondence online or update your email addresses, please visit us anytime at <https://sportal.uspto.gov/secure/myportal/privatepair>.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

IFJ



Dow AgroSciences LLC

02:53:15 p.m. 08-14-2012

1/2

PART B - FEE(S) TRANSMITTAL

12/091, 896

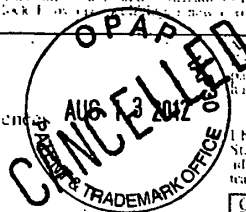
Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE
 Commissioner for Patents
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
 or **Fax** (571) 273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE of a regularly filed U.S. patent. It should be completed by the applicant or the attorney-in-fact. The fee(s) should be paid by check, money order, or credit card. The fee(s) should be paid to the U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, Virginia 22313-1450. The fee(s) should be paid by the date indicated on the form. The fee(s) should be paid by the date indicated on the form. The fee(s) should be paid by the date indicated on the form.

Freddie Baker Daniels LLP, Dow AgroSciences
 300 North Meridian Street, Suite 2700
 Indianapolis, IN 46204

08/15/2012 CCHAU2 00000061 041529 12091896

01 FC:1501 1740.00 DA
 02 FC:1504 300.00 DA



Certificate of Mailing or Transmission
 I hereby certify that this Patent Application is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE, P.O. Box 1450, Alexandria, Virginia 22313-1450, on the date indicated below.

Gretchen Haley	
Gretchen Haley	
8/14/12	

APPLICATION NO.	FILED DATE	FIRST NAMED INVENTOR	AUTHORITY CHECK NO.	CONFIRMATION NO.
12001896	11-02-2008	Terry R. Wright	DAS-10129-US-02	6428

TITLE OF INVENTION: NOVEL HERBICIDE RESISTANCE GENES

APPL. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	FEES PAID ISSUE FEE	TOTAL FEES DUE	DATE PAID
nonprovisional	NO	\$1740	\$300	\$0	\$2040	09/11/2012

EXAMINER	ART UNIT	CLASSIFICATION
KRUSE, DAVID H	1635	000-00000

1. Change of correspondence address or indication of "Free Address" (37 CFR 1.33(a)).
☐ Change of correspondence address (for Change of Correspondence Address form PTO/SB/122) attached.
☒ "Free Address" indication (or "Free Address" Indication form PTO/SB/147; Rev. 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list:
 (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Kenneth B. Ludwig
 2 Jim Daly
 3 Freddie Baker Daniels LLP

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

Dow AgroSciences, LLC.

(B) RESIDENCE (CITY AND STATE OR COUNTRY)

Indianapolis, IN USA

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
☒ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies

4b. Payment of Fees: (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 04-1529 (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant, a registered attorney or agent, or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature

Kenneth B. Ludwig

Date

Aug 14, 2012

Typed or printed name

Kenneth B. Ludwig

Registration No.

42,814

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.314. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the complete application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1150, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P. O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/091,896	10/09/2012	8283522	DAS-PO129-US-02	6428

83067 7590 09/19/2012
Faegre Baker Daniels LLP- Dow AgroSciences
300 North Meridian Street, Suite 2700
Indianapolis, IN 46204

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 907 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Terry R. Wright, Westfield, IN;
Justin M. Lira, Fishers, IN;
Terence Anthony Walsh, Zionsville, IN;
Donald J. Merlo, Camel, IN;
Jayakumar P. Samuel, Carmel, IN;
Gaofeng Lin, Zionsville, IN;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

IR103 (Rev. 10/09)

To: inteas@faegrebd.com,cynthia.payson@faegrebd.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 83067

Sep 20, 2012 05:34:00 AM

Dear PAIR Customer:

Faegre Baker Daniels LLP- Dow AgroSciences
300 North Meridian Street, Suite 2700
Indianapolis, IN 46204
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 83067 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:

The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
12091896	ISSUE.NTF	09/19/2012	DAS-PO129-US-02

To view your correspondence online or update your email addresses, please visit us anytime at <https://sportal.uspto.gov/secure/myportal/privatepair>.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

	IN THE UNITED STATES PATENT AND TRADEMARK OFFICE	
<i>Inventors</i>	Terry R. Wright, et al.	)
		)
<i>Invention:</i>	Novel Herbicide Resistance	)
	Genes	)
		)
<i>Patent No.:</i>	8,283,522	)
		)
<i>Serial No.:</i>		12/091,896
<i>Issue Date:</i>	October 9, 2012	)
		)
<i>Filing Date:</i>		November 3, 2008
<i>Attorney Docket No.:</i>	DAS-P0129-02-US	)
		)
		Confirmation No. 6428

REQUEST FOR CERTIFICATE OF CORRECTION
UNDER 37 C.F.R. § 1.323

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant respectfully requests a Certificate of Correction under 37 C.F.R. § 1.323 in the above-identified patent, in accordance with the enclosed form PTO/SB/44.

This request is being filed to correct a typographical error in the claims. The word "arlyoxyalkanoate" should be corrected to "aryloxyalkanoate" in claims 3, 4, 7, and 8. This mistake occurred in good faith and was not the fault of the U.S. Patent & Trademark Office.

This request satisfies the requirements of 35 U.S.C. § 255, because the mistake is of a clerical or typographical nature, and correcting the typographical mistake would not constitute new matter or require reexamination.

Applicant submits herewith payment in the amount of \$100.00, as required by 37 C.F.R. § 1.20(a). In the event Applicant has overlooked the need for an extension of time or payment of an additional fee, Applicant hereby petitions therefor and authorizes that any charges be made to Deposit Account No. 02-0390 Faegre Baker Daniels LLP.

If any questions concerning this application should arise, the Examiner is encouraged to telephone the undersigned at 317-237-0300.

Respectfully submitted,
/Patrick M. Bickley/
Patrick M. Bickley, Reg. No. 68,575
FAEGRE BAKER DANIELS LLP
300 North Meridian Street, Suite 2700
Indianapolis, IN 46204
Telephone: (317) 237-0300
Fax: (317) 237-1000

DMS_US 52292150v1

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 1 of 1

PATENT NO. : 8,283,522

APPLICATION NO.: 12/091,896

ISSUE DATE : Oct. 9, 2012

INVENTOR(S) : Terry R. Wright, Justin M. Lira, Terrence Anthony Walsh, Donald J. Merlo, Jayakumar P. Samuel, and Gaogen Lin.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Claim 3

Column 117, line 62, delete "arlyoxyalkanoate" and insert -- aryloxyalkanoate --.

Column 117, line 66, delete "arlyoxyalkanoate" and insert -- aryloxyalkanoate --.

Claim 4

Column 118, line 54, delete "arlyoxyalkanoate" and insert -- aryloxyalkanoate --.

Claim 7

Column 118, line 60, delete "arlyoxyalkanoate" and insert -- aryloxyalkanoate --.

Claim 8

Column 118, line 63, delete "arlyoxyalkanoate" and insert -- aryloxyalkanoate --.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Faegre Baker Daniels, LLP
300 North Meridian Street, Suite 2700
Indianapolis, Indiana 46204

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal				
Application Number:		12091896		
Filing Date:		03-Nov-2008		
Title of Invention:		NOVEL HERBICIDE RESISTANCE GENES		
First Named Inventor/Applicant Name:		Terry R. Wright		
Filer:		Patrick M. Bickley		
Attorney Docket Number:		DAS-PO129-US-02		
Filed as Large Entity				
U.S. National Stage under 35 USC 371 Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Certificate of Correction	1811	1	100	100
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				100

Electronic Acknowledgement Receipt	
EFS ID:	16080227
Application Number:	12091896
International Application Number:	
Confirmation Number:	6428
Title of Invention:	NOVEL HERBICIDE RESISTANCE GENES
First Named Inventor/Applicant Name:	Terry R. Wright
Customer Number:	83067
Filer:	Patrick M. Bickley
Filer Authorized By:	
Attorney Docket Number:	DAS-PO129-US-02
Receipt Date:	19-JUN-2013
Filing Date:	03-NOV-2008
Time Stamp:	11:16:19
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 100
RAM confirmation Number	9616
Deposit Account	020390
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. 1.492 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)					
Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)					
Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)					
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Certificate of Correction	52292150_1.pdf	76232 1856c652135c16a73bb99ba9578dc37d6cd8151	no	1
Warnings:					
Information:					
2	Request for Certificate of Correction	sb0044.pdf	164634 1eedefc7c3f5c980215fb0b7ad707352f8c206e	no	2
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30090 7e1f3abbd41aa39bd62060639ffce1298e5d6347	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			270956		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 8,283,522 B2
APPLICATION NO. : 12/091896
DATED : October 9, 2012
INVENTOR(S) : Terry R. Wright et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims:

Claim 3

Column 117, line 62, delete "arlyoxyalkanoate" and insert -- aryloxyalkanoate --.
Column 117, line 66, delete "arlyoxyalkanoate" and insert -- aryloxyalkanoate --.

Claim 4

Column 118, line 54, delete "arlyoxyalkanoate" and insert -- aryloxyalkanoate --.

Claim 7

Column 118, line 60, delete "arlyoxyalkanoate" and insert -- aryloxyalkanoate --.

Claim 8

Column 118, line 63, delete "arlyoxyalkanoate" and insert -- aryloxyalkanoate --.

Signed and Sealed this
Twenty-third Day of July, 2013



Teresa Stanek Rea
Acting Director of the United States Patent and Trademark Office

**REEXAMINATION OR SUPPLEMENTAL
EXAMINATION – PATENT OWNER POWER OF
ATTORNEY OR REVOCATION OF POWER OF
ATTORNEY WITH A NEW POWER OF ATTORNEY
AND CHANGE OF CORRESPONDENCE ADDRESS
FOR REEXAMINATION OR SUPPLEMENTAL
EXAMINATION AND PATENT**

Control Number(s)	90/019,131
Filing Date(s)	November 18, 2022
First Named Inventor	Terry Wright
Title	NOVEL HERBICIDE RESISTANCE GENES
Patent Number	8,283,522
Examiner Name	Sharon L Turner
Attorney Docket No(s)	15265.0010-00000

I. Power of Attorney. This form may be used to change the Power of Attorney in a reexamination or supplemental examination proceeding (or multiple proceedings where merged). This form may also be used to change the Power of Attorney in the patent file; in such a case, a copy of this form will be placed in both the patent file and the reexamination or supplemental examination proceeding.

A. Revocation of Previous Power of Attorney. I hereby revoke all previous patent owner powers of attorney, if any, given:

- ☒ in the above-identified reexamination or supplemental examination proceeding control number(s) (more than one may be changed only if the proceedings are merged).
- ☒ in the file of the above-identified patent.

(check BOTH boxes if change in BOTH the patent file and the reexamination or supplemental examination proceeding is requested).

B. Designation of Power of Attorney.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the Customer Number identified in the box at right as my/our attorney(s) or agent(s) to prosecute the proceeding(s)/patent identified above and selected in section I(A), and to transact all business in the United States Patent and Trademark Office connected therewith:

22852

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) to prosecute the proceeding(s) identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Authorization for the Power of Attorney is provided by the signature on page 2 of this form.

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OR

☐ The address associated with the Customer Number identified in the box at right:

☐ Firm or
Individual
Name

Address

City

State

Zip

Country

Telephone

Email

NOTE: THE CORRESPONDENCE ADDRESS FOR THE REEXAMINATION OR SUPPLEMENTAL EXAMINATION PROCEEDING CONTROL NUMBER(S) MUST BE THE SAME AS THAT FOR THE PATENT. SEE 37 CFR 1.33.

III. Authorization for Power of Attorney and (if selected) Change of Correspondence Address

I am the:

☐ Inventor, having ownership of the patent being reexamined.

OR

☒ Patent owner.

Statement under 37 CFR 3.73(c) (Form PTO/AIA/96) submitted herewith or filed on _____.

Signature of Inventor or Patent Owner	/Kurt Van Thomme/	Date	16 December 2022
Name	Kurt Van Thomme	Telephone	
Title and Company	Assistant Secretary, Corteva Agriscience LLC		

NOTE: Signatures of all the inventors or patent owners of the entire interest or their representative(s) are required. If more than one signature is required, submit multiple forms, check the box below, and identify the total number of forms submitted in the blank below.

☒ A total of 1 forms are submitted. If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
12/091,896

RECEIPT DATE / TIME
12/20/2022 03:51:17 PM ET

ATTORNEY DOCKET #
DAS-PO129-US-02

Title of Invention

NOVEL HERBICIDE RESISTANCE GENES

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	8283522
CONFIRMATION #	6428	FILED BY	Charlene Woods
PATENT CENTER #	61329137	FILING DATE	11/03/2008
CUSTOMER #	83067	FIRST NAMED INVENTOR	Terry R. Wright
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Charles Van Horn

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
Reexam_90019131_Power_of_Attorney.pdf	3	Power of Attorney	493 KB
USP_8283522_-_3_73_c_-_aia0096.pdf	3	Assignee showing of ownership per 37 CFR 3.73	115 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
Reexam_90019131_Power_of_	8750A4C327A1268DAB5F345AE21E1B25EF3AED5EFC1E6088E

Attorney.pdf	5C5C2B7A1AF825764AEE6500F79448421D967A60F345CA8B75 2AC696C0776F648116CF28BCEED11
USP_8283522_-_3_73_c_-_aia0096.pdf	040AB59CE22691F85FE2153B52FFB78CA9DE89BBF55C32321 0188D4686FDCC79E325527445518D78C3C6AF9EBD3CD4AD1 35C3934987663ECB959B6E71ADB38AF

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: CORTEVA AGRISCIENCE LLCApplication No./Patent No.: 8,283,522Filed/Issue Date: October 9, 2012Titled: NOVEL HERBICIDE RESISTANCE GENESCORTEVA AGRISCIENCE LLC, a limited liability company

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):1. ☒ The assignee of the entire right, title, and interest.2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):☐ The extent (by percentage) of its ownership interest is ____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:1. From: Terry R. Wright, Justin M. Lira, Terence A. Walsh, Donald J. Merlo, Pon Samuel Jayakumar, Gaofeng Lin To: Dow AgroSciences LLCThe document was recorded in the United States Patent and Trademark Office at
Reel 021361, Frame 0768, or for which a copy thereof is attached.2. From: Dow AgroSciences LLC To: Corteva Agriscience LLCThe document was recorded in the United States Patent and Trademark Office at
Reel 058044, Frame 0184, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

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4. From: _____ To: _____

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The document was recorded in the United States Patent and Trademark Office at
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☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Kurt Van Thomme/

16 December 2022

Signature

Date

Kurt Van Thomme

Assistant Secretary

Printed or Typed Name

Title or Registration Number

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/091,896	11/03/2008	Terry R. Wright	15265.0010-00000

CONFIRMATION NO. 6428

POA ACCEPTANCE LETTER

22852
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413



Date Mailed: 01/11/2023

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/20/2022.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/zmoguss/



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/091,896	11/03/2008	Terry R. Wright	DAS-PO129-US-02

CONFIRMATION NO. 6428

POWER OF ATTORNEY NOTICE



83067
Faegre Drinker Biddle & Reath LLP-Dow AgroSciences
300 North Meridian Street
Suite 2500
Indianapolis, IN 46204

Date Mailed: 01/11/2023

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/20/2022.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/zmoguss/

To: regional-desk@finnegan.com,,
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Jan 11, 2023 03:32:57 AM

Dear PAIR Customer:

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 22852 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

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Application	Document	Mailroom Date	Attorney Docket No.
12091896	N570	01/11/2023	15265.0010-00000
	N570	01/11/2023	15265.0010-00000

To view your correspondence online or update your email addresses, please visit us anytime at <https://sportal.uspto.gov/secure/myportal/privatepair>.

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Thank you for prompt attention to this notice,

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