

Application No.: 16/633,482

Docket No.: 32471/181399
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Lothar Lorentz et al.

Application No.: 16/633,482

Confirmation No.: 5657

Filed: January 23, 2020

Art Unit: 1616

For: USE OF HERBICIDAL COMPOSITIONS BASED
ON L-GLUFOSINATE IN TOLERANT FIELD
CROPS

Examiner: Erin E. Hirt

DECLARATION OF INGO MEINERS UNDER 37 C.F.R. §1.132

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

Dear Sir:

I, Dr. Ingo Meiners, state as follows:

[0001] I have been employed for approximately 4 ½ years by BASF, the assignee of the above-identified application. My current position at the BASF Corporation is R&D Group leader – Weed Control, with responsibility for Research & Development of herbicides to provide new and innovative weed control options for farmers. Me and my team is supporting North America as well as global herbicide research, with a particular focus on glufosinate - ammonium. Previously, I held similar research positions at other companies dating back to 2012. I earned Ph.D., Master of Science, and Bachelor of Science diplomas in in agronomy from the Justus-Liebig-University in Giessen, Germany.

[0002] I fully understand the subject matter of U.S. Patent Application No. 16/633,482. I have also read and understand the Office Action dated July 14, 2022 that issued in connection with the above-identified application. Finally, I have read and understand the claims submitted in the Amendment filed herewith.

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[0003] In addition, I have read and understand the following references cited in the Office Action dated July 14, 2022: **Hacker** et al. (U.S. Patent Publication 2006/0111240) in view of **FAO** (<https://www.fao.org/forestry/8105-095d871fa9fa5920c9b189dda046a5a54.pdf>, 2003), **Derr** et al., (J. Environ. Hort., 2016, 34(4), 123-130), **DoMyOwn** (<https://www.domyown.com/what-is-the-best-temperature-to-apply-gordons-ornamec-170-graa-herbicide-qa-26957.html>), and **Takematsu** U.S. Patent No. 4,265,654.

[0004] In my opinion, a person of ordinary skill in the art at the time of filing of this application would have found the claimed invention surprising and unexpected.

[0005] The use of racemic glufosinate (or agronomically acceptable salts thereof) for controlling harmful plants has some disadvantages under certain environmental conditions, such as: (a) that the selectivity in glufosinate tolerant field crops is lower than desired, thereby causing unwanted damage (i.e. phytotoxicity) and/or unwanted reduced harvest yields of said tolerant field crops, (b) that the herbicidal activity against harmful plants is not high enough, and (c) that the amount (dose rate) needed to achieve sufficient control of harmful plants is too high.

[0006] Surprisingly, as described in the application and as recited in independent claim 10, the use of certain glufosinate compositions (i.e., comprising L-glufosinate and/or salts thereof, wherein the composition contains less than 5 mol. % of D-glufosinate and/or agronomically acceptable salts thereof, based on the total amount of L-glufosinate and salts thereof) for controlling harmful plants in a glufosinate tolerant field crop under certain environmental conditions (i.e., at an air temperature of 18 °C or above when the temperature is measured 2 meters above the ground) were found to exhibit unexpected improvements as compared to the use of racemic glufosinate (and/or agronomically acceptable salts thereof), including:

- (i) an increase in the control of harmful plants in comparison to twice the molar amount of racemic glufosinate and/or agronomically acceptable salts thereof, and/or
- (ii) a reduction of phytotoxicity caused to the glufosinate tolerant field crop, in comparison to the same molar amount of racemic glufosinate and/or agronomically acceptable salts thereof.

[0007] Such surprising results are shown by the EXAMPLES of the application.

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[0008] Tables 1A and 2A of the application show the surprising increase in control of harmful plants in comparison to twice the molar amount of racemic glufosinate-ammonium:

TABLE 1A

Ratings of herbicidal activity in field trials against the above-mentioned harmful plant species after single post-emergence treatment with products P1 and PX in an amount of 300 g/ha of L-glufosinate-ammonium and 300 g/ha of racemic glufosinate-ammonium, respectively

Weed (BBCH stage at treatment)	Product					
	P1: 300 g/ha of L-glufosinate-ammonium			PX: 300 g/ha of racemic glufosinate-ammonium		
	DAA 7	DAA 14	DAA 21	DAA 7	DAA 14	DAA 21
AMAPA (15)	100%	100%	100%	63%	70%	75%
ABUTH (13)	100%	100%	100%	78%	82%	83%
TRTPO (19)	90%	92%	93%	60%	63%	60%

TABLE 2A

Ratings of herbicidal activity in field trials against the above-mentioned harmful plant species after a single post-emergence treatment with products P1 and PX in an amount of 600 g/ha of L-glufosinate-ammonium and 600 g/ha of racemic glufosinate-ammonium, respectively

Weed (BBCH stage)	Product					
	P1: 600 g/ha of L-glufosinate-ammonium			PX: 600 g/ha of racemic glufosinate-ammonium		
	DAA 7	DAA 14	DAA 21	DAA 7	DAA 14	DAA 21
AMAPA (15)	100%	100%	100%	95%	95%	97%
ABUTH (13)	100%	100%	100%	100%	100%	100%
TRTPO (19)	95%	95%	95%	82%	85%	87%

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[0009] Table 2B of the application shows the surprising reduction of phytotoxicity caused to glufosinate tolerant field crops in comparison to the same molar amount of racemic glufosinate-ammonium:

TABLE 2B

Ratings of herbicidal activity in field trials against the above-mentioned glufosinate tolerant field crop species GLXMA, GOSHI and ZEAMX after a single post-emergence treatment with products P1 and PX in an amount of 600 g/ha of L-glufosinate-ammonium and 600 g/ha of racemic glufosinate-ammonium, respectively								
Field crop (BBCH stage)	Product							
	P1: 600 g/ha of L-glufosinate-ammonium				PX: 600 g/ha of racemic glufosinate-ammonium			
	DAA 7	DAA 15	DAA 28	MAX	DAA 7	DAA 15	DAA 28	MAX
GLXMA (12)	3%	0%	0%	3%	8%	5%	5%	8%
GOSHI (11)	0%	0%	0%	0%	10%	7%	5%	10%
ZEAMX (13)	8%	5%	5%	8%	13%	8%	6%	13%

[0010] In fact, Table 2C shows the surprising reduction of phytotoxicity caused to a glufosinate tolerant field crop in comparison to 2/3 the molar amount of racemic glufosinate-ammonium:

TABLE 2C

Ratings of herbicidal activity in field trials against the above-mentioned glufosinate tolerant field crop species BRSNS after a single post-emergence treatment with products P1 and PX in an amount of 1800 g/ha of L-glufosinate-ammonium and 1200 g/ha of racemic glufosinate-ammonium, respectively								
Field crop (BBCH stage)	Product							
	P1: 1800 g/ha of L-glufosinate-ammonium				PX: 1200 g/ha of racemic glufosinate-ammonium			
	DAA 7	DAA 15	DAA 28	MAX	DAA 7	DAA 15	DAA 28	MAX
BRSNS (14)	15%	4%	7%	15%	18%	9%	7%	18%

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[0011] These results are surprising and would not have been expected by a person of ordinary skill in the art. By applying the L-glufosinate at the same molecular weight as racemate glufosinate, and practically twice as much L-glufosinate, you would have expected that the crop tolerance would be similar or even worse. The opposite was observed which one could not have expected.

[0012] I make this declaration to provide additional experimental data demonstrating reduction of phytotoxicity caused to glufosinate tolerant field crops in comparison to the same molar amount of racemic glufosinate-ammonium. The experiments described below were performed under my direction.

[0013] Methodology - green house experiments

[0014] Greenhouse trials were conducted to evaluate the phytotoxicity of L-glufosinate ammonium and the glufosinate-ammonium (GA) and L-glufosinate-Ammonium (LGA) were used as technical grade at 600 g/L. All treatments were applied with an adjuvant Sodium-lauryl-ester-sulfate (SLES) with adjuvant ratios typically used in commercial with Glufosinate formulations. The treatments were applied with a track sprayer using flat fan nozzles, a water volume of 200 L/ha and one replicate per treatment.

[0015] The herbicide combinations were applied post-emergence to soybeans at growth stage GS13. Two glufosinate-tolerant soybean cultivars were used: (i) GLXMA (S1) – CZ 1660 GTLL) and (ii) GLXMA (S1) – CZ 3519 GTLL. A visual crop injury assessment (i.e., % crop injury compared to an untreated control) was made at 7 days after treatment (DAT).

[0016] A different greenhouse experiment was conducted to evaluate weed control efficacy of glufosinate-ammonium (GA) and L-glufosinate-Ammonium (LGA) against various agronomically important weed species. Like above LGA and GA were used as technical grade at 600 g/L and all treatments were applied with the adjuvant SLES. The treatments were applied with a track sprayer using flat fan nozzles, a water volume of 140 L/ha and one replicate per treatment

[0017] The herbicide combinations were applied post-emergence to weed species at growth stages GS14-20. The weed species were ABUTH (*Abutilon Theophrasti*), AMATA (*Amaranthus Tamariscinus*), CHEAL (*Chenopodium album*), ECHCG (*Echinochloa crus-galli*) and KCHSC (*Kochia Scoparia*). A visual weed control assessment (i.e., % weed control efficacy compared to an untreated control) was made at 7 days after application (DAA).

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[0018] Experimental Results – field

Tables 2d show additional data which were recorded in the same field trial which as used in the patent application (compare Table 1A and Table 2a). A similar or an increase in control of harmful plants in comparison to twice the molar amount of racemic glufosinate-ammonium can be observed.

Table 2d: Ratings of herbicidal activity in a field experiment against the above mentioned glufosinate tolerant crops canola, soybeans and field corn after a single post-emergence treatments with racemate glufosinate-ammonium (PX, GA) and L-glufosinate-ammonium (P1, LGA), 14 Days after application (DAA).

Weed species	P1: LGA	PX:GA	P1: LGA	PX:GA
	150 g/ha	300 g/ha	300 g/ha	600 g/ha
	DAA 14	DAA 14	DAA 14	DAA 14
AMAPA (15)	83	70	100	95
ABUTH (13)	82	82	100	100
TRTPO (19)	93	63	92	85

[0019] Experimental Results – greenhouse

[0020] The results of the phytotoxicity experiment are summarized in table 2e below. Surprisingly, all LGA treatments are causing less phytotoxicity than respective GA treatments applied at the same molecular weight. There is some difference in sensitivity to glufosinate between the two soybean varieties but the difference in crop response from LGA as compared to GA is visible in both varieties and at all three application rates 300, 600 and 1200 g/ha. This was not expected.

Table 2e: Ratings of herbicidal activity (phytotoxicity) in an greenhouse experiment against the above mentioned glufosinate tolerant soybeans (GLXMA) after a single post-emergence treatments with racemate glufosinate-ammonium (GA) and L-glufosinate-ammonium (LGA) rated 7 DAA.

Field crop	LGA 300 g/ha	GA 300 g/ha	LGA 600 g/ha	GA 600 g/ha	LGA 1200 g/ha	GA 1200 g/ha
GLXMA (CZ1660)	0	5	10	15	10	40
GLXMA (CZ3519)	5	10	10	35	15	70
average	2.5	7.5	10	25	12.5	55

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[0021] The weed control results are summarized in table 2f below. Surprisingly, LGA treatments applied at half the molecular weight than GA show better weed control across all tested weed species than GA. This was not expected.

Table 2f: Ratings of herbicidal activity in an greenhouse experiment against different weed species after a single post-emergence treatments with racemate glufosinate-ammonium (GA) and L-glufosinate-ammonium (LGA).

Weed species	GS/size	LGA 300 g/ha	GA 600 g/ha	LGA 600 g/ha	GA 1200 g/ha
ABUTH	9 cm	30	50	85	75
AMATA	9 cm	75	70	83	80
CHEAL	7.5 cm	73	50	95	95
ECHCG	14	40	65	85	70
KCHSC	7.5 cm	80	50	88	93
Average (5)		60	57	87	83

In view of the above, I believe that the invention set forth in the pending claims would not have been obvious to a person of ordinary skill in the art and indeed is surprising and unexpected.

All statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true; further, these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001, Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any patent resulting therefrom.

Respectfully submitted,



INGO MEINERS

Date: December 16, 2022

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