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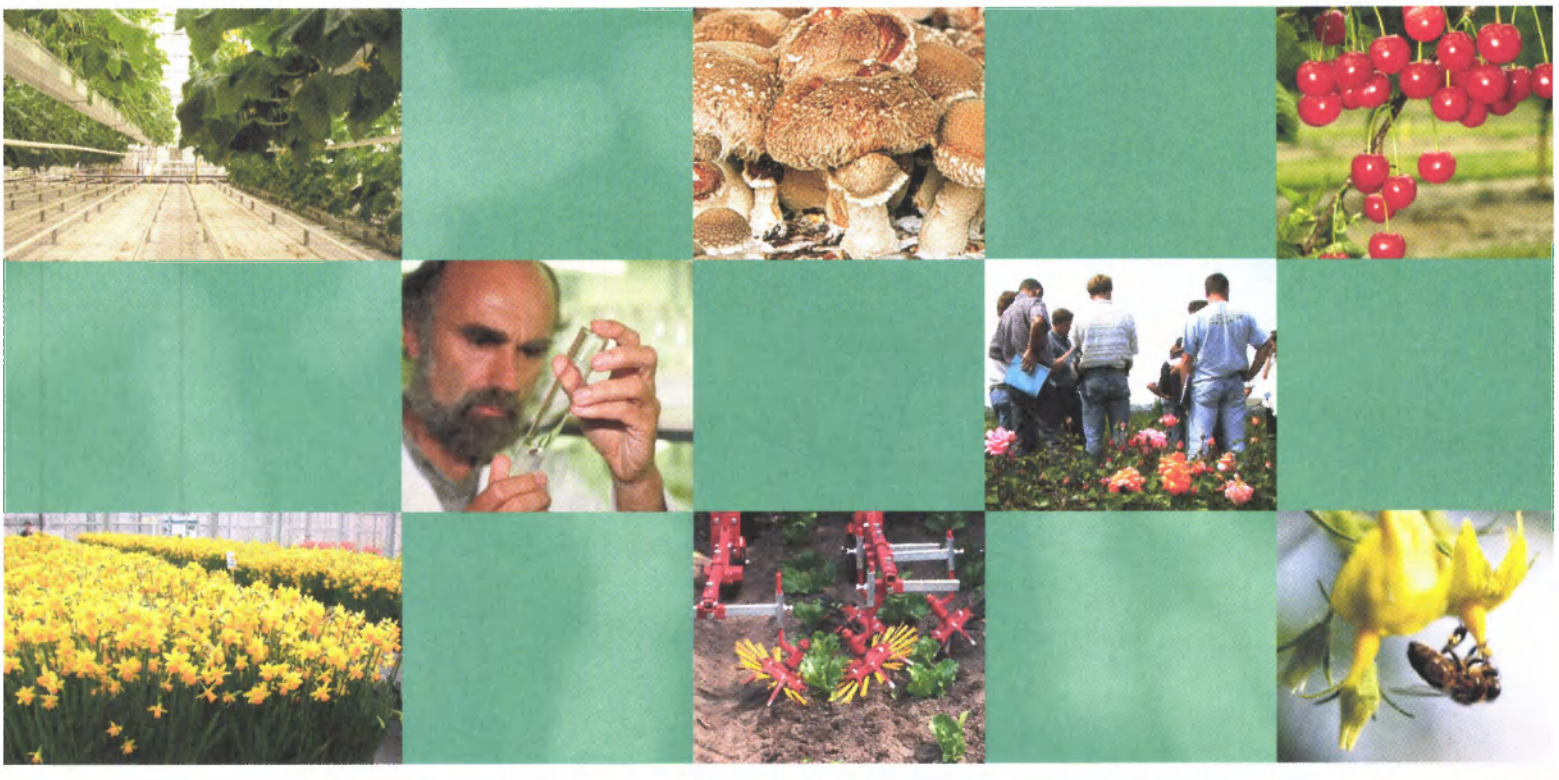
Effect of Pendimethalin 400WG OXX0404008 in lilies

Comparative field-trial of two pendimethalin formulations

A.Th.J Koster, J.P.M. Wijnker



Applied Plant Research
Research Unit Flowerbulbs and Nursery Stock
June 2006

PPO no. 340081

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Summary

In 2005 by order of Maktheshim Agan Benelux & Nordic (Mabeno) a study has been conducted to compare two pendimethalin formulations, a pendimethalin formulation from Mabeno with Stomp, a commercial formulation of pendimethalin. The research was conducted in the bulbous crop lily. It consisted of a field trial in which the pendimethalin was applied and agreenhouse trial to evaluate if this field application had an influence on the flower quality of the lilies.
There were no differences in efficacy of Stomp and Pendimethalin 400WG 0XX0404008 in weed control when applied at the same doses at the same application date. Both products had no adverse effects on bulb growth and flower-production when forced into flowering in the greenhouse after harvest in the field.

1 Introduction

In 2005 by order of Maktheshim Agan Benelux & Nordic (Mabeno) a study has been conducted to compare two pendimethalin formulations. The research was conducted in the bulbous crop lily. It consisted in a field trial in which the pendimethalin was applied and a greenhouse trial to see if this field application had an influence on the flower quality of the lilies. The aim is to compare effectiveness of a pendimethalin formulation from Mabeno with a commercial formulation of pendimethalin Stomp.
These GEP-trials were conducted according the EPPO-guidelines (PP 1/88 (2)).
In chapter 2 the experimental lay-out is described. In the next chapter the results of the experiments are discussed. In chapter 4 conclusions are made, based on the results. In the appendices the data of the trials are presented.

2 Experimental Lay-out

2.1 General information

Project number/Trial number	:	340081 / H05l1
Title/ aim or Goal	:	Comparison of two formulations of pendimethalin on weed control and phytotoxicity in the culture of lilies
Project leader	:	J.P.M. Wijnker
Project member(s)	:	B. Buitenwerf, H. van Aanholt
Experimental Description	:	15/03/2005
Standard Operating Procedures	:	SOP02 and SOP04

2.2 Data Field Trial

2.2.1 Experimental data

1.	Crop	: Lily
	- cultivar	: Cordelia
	- plant size	: 8-10
	-Pretreatment bulbs	: no
	-Standard desinfection bulbs	: yes
2.	Disease-, pest-, weed pressure	: weed
	-natural occurance	: yes
	- artificially	: no
	*Inoculation method (of infection)	:
	* Amount	:
3.	Location	
	- greenhouse/field	: field, Vledder
	- soil type	: cover sand soil
	- previous crop	: grass
	- standard fumigation of soil desinfection	: no
	**if yes, name chemical and dosis	:
4.	Plot size (bruto area/surface.)	: 3.4 m^2
	- netto surface.	: 1.5 m^2
	-number of bulbs	: 160
	- bulbweight	: 2000 gr
	- number of replications	: 4
5.	trial data	
	- infection	: n/a
	- soil treatment(s)	: n/a
	- chemical application	: see § 1.3
	- planting date(s)	: 21st of April
	- plantdepth	: 10 cm

6. Measurements and observations

I. Efficacy	:
- crop damage	: yes
- bulb damage	: no
- root damage	: no
- yield	: yes
- plant weight (flower production)	: n/a
II. Phytotoxicity	:
- emergence	: no
- stand(crop)	: yes
- die back or decrease	: yes
- yield	: yes
Observation scales 'fytotox.'	: 0-10 scales, where 0 =none or excellent, 10 = 100% affected or bad
idem, efficacy	: 0-10, where 0 = 100% diseased or no effect, 10 = healthy or 100% control

2.2.2 Treatments

1. Number of treatments and coding (assigned treatment number)

Treat. #	product	Name active ingredient (a.i.)	content a.i.	Formulation	Dosis in kg, l/ha	Mode of application/ timing
1.	Untreated check	--	--	--	--	--
2.	Untreated weeded	--	--	--	--	--
3.	Stomp	pendimethalin	400 g/l	SC	2	Pre-emergence
4.	Pendim. 400WG 0XX0404008	pendimethalin	400 g/kg	WG	2	Pre-emergence
5.	Stomp	pendimethalin	400 g/l	SC	4	Pre-emergence
6.	Pendim. 400WG 0XX0404008	pendimethalin	400 g/kg	WG	4	Pre-emergence
7.	Stomp	pendimethalin	400 g/l	SC	2	After emergence
8.	Pendim. 400WG 0XX0404008	pendimethalin	400 g/kg	WG	2	After emergence
9.	Stomp	pendimethalin	400 g/l	SC	4	After emergence
10.	Pendim. 400WG 0XX0404008	pendimethalin	400 g/kg	WG	4	After emergence

2. Application of treatment

Spraying:

-sprayer type	: Veeze hand-held sprayer with 3 nozzles
- nozzle type	: Lechler AD110 03 VS
- pressure	: 3 bar
- volume	: 800 l/ha
- Spraying-surface	: 2,25 m x 1,25 m

Trt. nr.	Treatment	Amount of carrying fluid in ml/treatment	Amount product added in ml/g	Amount of spray mixture (carrying fluid) in l/treatment
1.	Untreated check	--	--	--
2.	Untreated weeded	--	--	--
3.	Stomp	1000 ml	2.5	900 ml
4.	Pendim. 400WG 0XX0404008	1000 ml	2.5	900 ml
5.	Stomp	1000 ml	5	900 ml
6.	Pendim. 400WG 0XX0404008	1000 ml	5	900 ml
7.	Stomp	1000 ml	2.5	900 ml
8.	Pendim. 400WG 0XX0404008	1000 ml	2.5	900 ml
9.	Stomp	1000 ml	5	900 ml
10.	Pendim. 400WG 0XX0404008	1000 ml	5	900 ml

Spraying date:
28-04-2005 treatment 3 through 6
17-05-2005 treatment 7 through 10
On the 28th of June the whole plot was sprayed with cycloxidim 5 l/ha (Focus Plus) against Common Couch (*Agropyron repens,* AGRRE)
From the 7th of July the whole plot was sprayed weekly with asulam 0,33 l/ha(Asulox) and metamitron 0,16 kg/ha (Goltix WG)

2.2.3 Plot Plan

Repetition A	9	4	**Repetition C**
	6	1	
	1	8	
	10	2	
	2	9	
	4	6	
	5	7	
	7	3	
	3	5	
	6	10	
Repetition B	1	10	**Repetition D**
	2	6	
	3	2	
	7	5	
	8	3	
	4	7	
	10	8	
	6	4	
	5	9	
	9	1	

2.3 Data Greenhouse Trial

2.3.1 Experimental data

1.	Crop	: Lily
	- cultivar	: Cordelia
	- plant size	: 14-16
	-Pretreatment bulbs	: 0°C until planting
	-Standard desinfection bulbs	: yes
2.	Disease-, pest-, weed pressure	: no
	-natural occurance	:
	- artificially	:
	*Inoculation method (of infection)	:
	* Amount	:
3.	Location	
	- greenhouse/field	: greenhouse, Lisse
	- soil type	: potting soil
	- previous crop	: n/a
	- standard fumigation of soil desinfection	:
	**if yes, name chemical and dosis	:
4.	Plot size (bruto area/surface.)	: 0.24 m^2
	- netto surface.	: 0.24 m^2
	-number of bulbs	: 12
	- bulbweight	: 565 gr
	- number of replications	: 4
5.	trial data	
	- infection	: n/a
	- soil treatment(s)	: n/a
	- chemical application	: n/a
	- planting date(s)	: 22th of February 2006
	- plantdepth	: 10 cm
	- harvest date	: 30th of may 2006
	- greenhouse temperature	: 15°C
6.	Measurements and observations	
	I. Efficacy	: no
	- crop damage	: n/a
	- bulb damage	: n/a
	- root damage	: n/a
	- yield	: n/a
	- plant weight (flower production)	: n/a
	II. Phytotoxicity	:
	- emergence	: yes
	- stand(crop)	: yes
	- die back or decrease	: no
	- yield	: no
	- plant weight	: yes
	Observation scales 'phytotox.'	: 0-10 scales, where 0 =none or excellent, 10 = 100% affected or bad
	idem, efficacy	: 0-10, where 0 = 100% diseased or no effect, 10 = healthy or 100% control

7. Remarks or notes : Bulbs from the field trial were taken for this greenhouse trial.

2.3.2 Treatments

Bulbs were taken from the field trial, see §2.2.2. The treatment numbers in the greenhouse trial correspond with the treatments in the field trial.

2.3.3 Plotplan

Repetition A	10	2
	1	4
	5	7
	6	9
	3	8
Repetition B	9	10
	3	1
	8	7
	6	5
	4	2
Repetition C	2	1
	9	3
	6	8
	5	7
	4	10
Repetition D	7	6
	3	5
	1	2
	9	10
	4	8

3 Results

All results were analysed with ANOVA Genstat version 8.1

3.1 Weed control

The number of weeds was counted on the 7th and 28th of June. In treatment 2 the weeds were removed after each counting.

Table 1: *Number of weeds in the treatments on the 7th and 28th of June*

Trt. Nr.	Treatment			Number of weeds on the	
		Dose	timing*	7th of June	28th of June
1	Untreated check	-	-	20.75 a	48.8 a
2	Untreated weeded	-	-	21.50 a	42.5 a
3	Stomp	2	pe	7.50 b	19.2 b
4	Pendim. 400WG 0XX0404008	2	pe	6.00 b	12.8 bc
5	Stomp	4	pe	3.00 b	4.5 bc
6	Pendim. 400WG 0XX0404008	4	pe	5.25 b	10.0 bc
7	Stomp	2	ae	1.25 b	1.8 c
8	Pendim. 400WG 0XX0404008	2	ae	2.25 b	2.8 c
9	Stomp	4	ae	0.75 b	3.0 c
10	Pendim. 400WG 0XX0404008	4	ae	0.25 b	7.2 bc
F.prob				*<0.001*	*<0.001*
L.S.D.				*8.893*	*15.89*

*) pe = pre-emergence treatment; ae = after emergence treatment

The herbicide treatments showed a significant lower number of weeds. On the 7th of June no differences between the herbicide treatments were found. On the 28th of June only in treatment number 3, Stomp 2 l/ha pre-emerge, more weeds were counted in comparison to the treatments numbers 7, 8 and 9.
No differences were found between Stomp and Pendimethalin 400WG 0XX0404008 in the same application rate and timing. No differences were found between the two tested doses.

3.2 Crop growth

Table 2: Average crop standings on 23rd of May, 23rd of June and 10th of August 2005.

Trt. Nr.	Treatment			Crop standings on		
		Dose	timing*	23rd of May	23rd of June	10th of August
1	Untreated check	-	-	8.50	9.50	9.75
2	Untreated weeded	-	-	7.75	9.75	9.75
3	Stomp	2	pe	7.75	9.50	9.75
4	Pendim. 400WG 0XX0404008	2	pe	7.00	9.25	9.75
5	Stomp	4	pe	8.50	9.50	9.75
6	Pendim. 400WG 0XX0404008	4	pe	10.00	9.75	10.00
7	Stomp	2	ae	7.75	9.50	9.75
8	Pendim. 400WG 0XX0404008	2	ae	8.50	9.75	9.75
9	Stomp	4	ae	7.75	9.50	9.75
10	Pendim. 400WG 0XX0404008	4	ae	8.50	9.50	9.75
F.prob				*0.595*	*0.981*	*0.998*
L.S.D.						

*) pe = pre-emergence treatment; ae = after emergence treatment

During the growth season the crop standing was assessed three times. There were no differences in crop stand between the different treatments as shown in table 2.
After harvesting the bulbs were counted and weighed to determine the average bulb weight. The results are shown in table 3.
No differences in bulb weight were found between the treatments. It can be concluded that Stomp as well as Pendimethalin 400WG 0XX0404008 had no effect on the crop yield. At assessing the harvested bulbs some Fusarium infested bulbs and double-nosed bulbs were found. There was no effect of the treatments shown on the infested bulbs and the double-nosed bulbs, as shown in Table 4.

Table 3: The average bulb weight (in gr) of the lily bulbs per treatment after harvest, with significance-index.

Trt. Nr.	Treatment			Average bulb weight (in gr)
		Dose	timing*	
1	**Untreated check**	-	-	41.98
2	**Untreated weeded**	-	-	40.80
3	Stomp	2	pe	42.59
4	Pendim. 400WG 0XX0404008	2	pe	41.94
5	Stomp	4	pe	41.56
6	Pendim. 400WG 0XX0404008	4	pe	42.15
7	Stomp	2	ae	42.77
8	Pendim. 400WG 0XX0404008	2	ae	41.56
9	Stomp	4	ae	42.14
10	Pendim. 400WG 0XX0404008	4	ae	40.48
F.prob				*0.676*
L.S.D.				

*) pe = pre-emergence treatment; ae = after emergence treatment

Table 4: The average number of (*Fusarium*) infected bulbs and double nosed bulbs per treatment.

Trt. Nr.	Treatment			Number of	
		Dose	timing*	Infected bulbs	Double-nosed bulbs
1	**Untreated check**	-	-	14.00	3.75
2	**Untreated weeded**	-	-	13.50	4.00
3	Stomp	2	pe	11.00	2.75
4	Pendim. 400WG 0XX0404008	2	pe	12.75	3.25
5	Stomp	4	pe	13.75	3.25
6	Pendim. 400WG 0XX0404008	4	pe	11.75	4.50
7	Stomp	2	ae	13.25	3.50
8	Pendim. 400WG 0XX0404008	2	ae	14.00	3.25
9	Stomp	4	ae	12.50	3.50
10	Pendim. 400WG 0XX0404008	4	ae	12.00	5.25
F.prob				*0.856*	*0.804*
L.S.D.					

*) pe = pre-emergence treatment; ae = after emergence treatment

3.3 Greenhouse trial

The bulbs of the field-trial were planted to determine possible negative effects of the herbicides in growth and flowering in the following season. The bulbs were planted in the greenhouse at 22nd of February 2006 and harvested on the 30th of May 2006. After harvest until planting for forcing the bulbs were kept at 0°C. On the 27th of April the crop stands were assessed. The branches (plants) were cut when the first flowers opened. After cutting they were weighed. The crop stands and the average plant weight of the cut lilies shown in table 5.

Table 5: The average plant weight per treatment after forcing of the lilies from the field trial

Trt. Nr.	Treatment	Dose	timing*	Crop stand on 27th of April	Average plant weight (in gr)
1	**Untreated check**	-	-	9.25	130.5
2	**Untreated weeded**	-	-	9.25	130.3
3	Stomp	2	pe	8.75	129.3
4	Pendim. 400WG 0XX0404008	2	pe	8.50	133.8
5	Stomp	4	pe	9.25	130.0
6	Pendim. 400WG 0XX0404008	4	pe	9.50	127.0
7	Stomp	2	ae	9.50	132.1
8	Pendim. 400WG 0XX0404008	2	ae	9.50	130.1
9	Stomp	4	ae	9.25	130.1
10	Pendim. 400WG 0XX0404008	4	ae	9.00	123.3
F.prob				*0.944*	*0.931*
L.S.D.					

*) pe = pre-emergence treatment; ae = after emergence treatment

No effect of the field treatments with the herbicides Stomp and Pendimethalin 400WG 0XX0404008 were found in the floriculture of the lilies.

4 Conclusions

There were no differences in efficacy of Stomp and Pendimethalin 400WG 0XX0404008 in weed control when applied at the same doses at the same application date. Both products had no adverse effects on bulb growth and flower-production when forced into flowering after harvest in the field.

Appendix 1 Raw data Field trial

Trt.	Rep.	Nr. of good bulbs	weight	Nr. of double-bulbs	n weight double-n	Nr. diseased	weight diseased	total weight	total nr. of bulbs
1	a	111	4387	2	83	14	303	4773	127
	b	110	5011	3	156	12	298	5465	125
	c	113	4579	6	304	14	410	5293	133
	d	120	5078	4	214	16	489	5781	140
2	a	123	4729	4	230	12	339	5298	139
	b	114	4505	4	204	18	514	5223	136
	c	109	4796	5	265	14	378	5439	128
	d	126	5197	3	145	10	328	5670	139
3	a	116	5096	3	112	10	247	5455	129
	b	126	5040	2	162	10	293	5495	138
	c	119	5312	2	100	12	350	5762	133
	d	118	4932	4	156	12	296	5640	134
4	a	122	4886	3	117	11	264	5267	136
	b	109	4739	7	384	17	532	5655	133
	c	122	5052	1	72	12	449	5573	135
	d	122	5224	2	103	11	308	5635	135
5	a	121	5038	4	157	10	278	5473	135
	b	116	4782	3	158	22	633	5573	141
	c	116	4981	5	368	14	440	5789	135
	d	128	5178	1	54	9	265	5497	138
6	a	115	4979	4	276	17	404	5659	136
	b	119	4955	1	59	10	301	5315	130
	c	120	5194	8	400	10	293	5887	138
	d	120	4847	5	296	10	275	5418	135
7	a	122	4945	4	180	12	311	5436	138
	b	122	5234	3	121	18	438	5793	143
	c	119	5356	3	143	11	341	5840	133
	d	114	4861	4	193	12	358	5412	130
8	a	118	4952	6	263	14	325	5540	138
	b	113	4874	1	57	19	500	5431	133
	c	117	4788	3	195	14	404	5387	134
	d	132	5311	3	121	9	231	5663	144
9	a	110	4557	4	272	9	238	5067	123
	b	110	4721	3	133	16	380	5234	129
	c	114	4769	2	106	15	502	5377	131
	d	121	5130	5	310	10	216	5656	136
10	a	112	4263	4	241	11	299	4803	127
	b	119	5036	7	425	13	319	5780	139
	c	121	4918	3	208	12	416	5542	136
	d	117	4784	7	349	12	307	5440	136

* mostly fusarium-diseased

Appendix 2 Raw data Forcing Trial

Treatment	Repitition	weight	number
1	a	1613	12
1	b	1524	12
1	c	1502	12
1	d	1623	12
2	a	1667	12
2	b	1454	12
2	c	1571	12
2	d	1561	12
3	a	1346	12
3	b	1500	12
3	c	1634	11
3	d	1578	12
4	a	1766	12
4	b	1697	12
4	c	1204	10
4	d	1515	12
5	a	1589	12
5	b	1519	12
5	c	1577	12
5	d	1554	12
6	a	1495	12
6	b	1556	12
6	c	1588	12
6	d	1458	12
7	a	1687	12
7	b	1534	12
7	c	1518	11
7	d	1464	12
8	a	1681	12
8	b	1396	11
8	c	1523	12
8	d	1391	11
9	a	1403	12
9	b	1552	12
9	c	1541	12
9	d	1604	11
10	a	1441	12
10	b	1439	12
10	c	1373	11
10	d	1539	12