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"THE USE OF DIMETHIPIN AS A PLANT MATURITY REGULATOR ON SUNFLOWERS IN THE USA"

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SUMMARY

Dimethipin is a unique plant growth regulant which has been shown to accelerate the seed maturation of crops such as sunflower, oilseed rape and flax. This paper demonstrates its usefulness in the production of sunflowers. Dimethipin was applied to sunflower when the seed moisture was at 40 - 50%. The application rates of 0.36 and 0.56 kg a.i./ha reduced seed moisture to a harvestable level after three to four weeks. In nearly all the trials, harvest could begin at least 7 days before untreated plots and in many cases 10 - 14 days earlier. No differences were observed in % oil content or seed test weight. The trials conducted also illustrate an advantage of dimethipin over paraquat when rain occurred during the dry down period. Dimethipin treated seed heads did not reabsorb moisture while those treated with paraquat increased in seed moisture levels.

INTRODUCTION

The use of dimethipin as a plant growth regulant on sunflowers in the U.S.A. was an outcome of the discovery that moisture in rice seed heads could be reduced by an application 10 - 14 days prior to harvest. Since sunflowers grown in the upper midwest are exposed to excess rainfall or frequently frozen out prior to full maturity, the use of dimethipin as a maturation chemical has utility. The first studies in 1979 showed dimethipin to have unique properties for enhancing maturation rather than just as a desiccant. Of the 50 trials conducted in the U.S.A., sunflower has been found to be one of the most responsive crops to dimethipin. 1,2,3,4

MATERIALS AND METHODS

In sunflower field trials conducted, dimethipin was applied over-the-top to single or double row plots that were 4.5 to 9 m long. One hectare plots were used for aerial trials. The spray volume ranged from 50-375 l/ha. Petroleum oil based concentrates were used for surfactants with HARVADE 5F. HARVADE 25F does not need an additional surfactant on sunflower. The variables tested were the dimethipin rate and the timing of application (defined in terms of % seed moisture content). Evaluations were for the determination of seed moisture at intervals after treatment to define the moisture decline curve, as well as post-harvest evaluation of seed test weight and oil content.

RESULTS

As shown in Tables 1,2 and 3, there is good evidence that dimethipin may be applied at 50% seed m.c. or above, without significant effect on either seed test weight or oil content. This potentially offers greater flexibility in the timing of application than is possible with currently registered desiccants.

Table 1 HARVADE 5F on SUNFLOWER
York, North Dakota, U.S.A.

Days after treatment	% Seed moisture 0.36 kg a.i./ha*	0.67 kg a.i./ha*	Control
0			52.7
10	22.7	22.1	29.2
17	10.2	11.4	15.3
Test wt (lbs)	31.5	31.5	30.5
% oil content	45.5	43.6	44.5

* plus 1 litre petroleum based oil concentrate surfactant per hectare

Harvested: 27 September '83

Table 2 HARVADE 5F on SUNFLOWER
Washburn, North Dakota, U.S.A.

Days after treatment	% Seed moisture 0.36 kg a.i./ha*	0.56 kg a.i./ha*	Control
0			50.0
13	43.0	44.5	45.7
21	21.8	21.2	31.4
28	19.1	19.4	34.2
47**	14.0	13.9	20.6
% oil content	35.5	34.5	35.7

* plus 1 litre petroleum based oil concentrate surfactant per hectare
** two weeks of rain

Table 3 HARVADE 5F on SUNFLOWER
York, North Dakota, U.S.A.

Days after treatment	% Seed moisture 0.33 kg a.i./ha*	0.56 kg a.i./ha*	Control
0			50.0
12	40.2	41.5	44.2
20	30.0	25.1	32.7
27	19.8	24.1	29.3
47*	14.2	15.1	24.5
% oil content	43.8	39.4	40.3

* two weeks of rain

Table 4 shows the response of sunflower seed to applications at different moisture levels. In each case, dimethipin reduced seed moisture faster than the unteated plants.

Table 4 shows the effect of dimethipin rates versus moisture content of seed.

Table 4 HARVADE 5F APPLIED TO SUNFLOWER AT DIFFERENT MOISTURE LEVELS

Rate kg/ha	% m.c. at application	Application date	Washburn, ND % m.c.	York, ND % m.c.
0.37	50	September 2nd	14.0	16.6
0.56	50	" "	13.9	14.2
0.37	40	September 10th	13.6	15.1
0.56	40	" "	13.4	13.3
0.37	30	September 24th	14.2	16.4
0.56	30	" "	18.5	16.4
Paraquat	30	September 24th	18.6	21.1
Untreated	-		20.6	28.3

In addition to being able to apply dimethipin over an extended period of time, dimethipin also has demonstrated another significant advantage over paraquat. Dimethipin treated heads have been found to reabsorb less moisture after treatment. Heavy rain often falls during the sunflower maturation period and slows down the drying process. The reabsorption of moisture is a real problem when desiccants are used as is shown in Table 5.

Table 5 EFFECTS OF RAINFALL ON SUNFLOWER MOISTURE LEVELS

Treatment	Dosage kg a.i./ha	Days after treatment 0	14	21*	28
Untreated	-	35	29.5	18.7	15.5
Dimethipin	0.56	35	15.7	10.4	9.3
Paraquat	0.28	35	15.7	11.9	13.5

* Intermittent rainfall between 16 - 23 days after treatment
CV: Dalgren 809

DISCUSSION

Trials throughout the U.S. upper midwest sunflower belt have shown that pre-harvest dimethipin application is very effective for reducing the moisture content of seed in the field, irrespective of weather conditions after application. Application rates in the range of 0.37 to 0.56 kg a.i./ha provided the maximum acceleration for seed drying. Higher application rates provide only marginally improved activity. The most frequent response is that, 5 to 7 days after treatment, the seed moisture of treated heads is reduced by at least 3 to 5% when compared with untreated controls. This differential can increase to 10% or more by the time a harvestable seed moisture is reached (20-25%), in which case an advance in harvest date of 7 to 10 days is possible.

CONCLUSION

The significance of dimethipin activity is in providing the sunflower grower with a tool for better managing his harvest, for instance; allow him to harvest his crop as soon as possible after physiological maturity. This would minimize weathering of the seed, head disease, head shatter or drop, bird damage and lodging. Similarly, such a scheduling tool could help the grower get an early start on harvest, so that he could (a) get a longer use season out of his harvesting and transportation equipment, (b) get at least part of his crop sold while the early season price is still high, (c) be able to use a normally later maturing variety with high yield potential and oil content, or (d) get his double or fall rotational crop in the ground sooner.

REFERENCES

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