TESTING THE GROUND FOR REGULAR DESICCATION OF SUNFLOWER BEFORE HARVEST

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INTRODUCTION

The development of domestic sunflower hybrids and their large-scale introduction into the commercial production increased perceptibly the yields of this crop in Yugoslavia (Nikolié, 1976). It is important for the full realization of the yielding potentials of sunflower hybrids, same as for sunflower varieties, to find efficient solutions for the critical period of sunflower maturation and harvest. Likewise, sunflower hybrids are exposed to the attacks of fungal diseases which may decrease considerably their yields and quality (Acimovic, 1976). Fungal diseases increase the losses during harvest and those caused by birds. Also, considerable losses occur due to seed shedding which, in turn, imposes the problem of volunteer sunflowers in the subsequent crop.

These serious limitations to the potential yields of sunflower hybrids make prominent the economic importance of desiccation which efficiently shortens the final part of sunflower vegetation ènabling a much earlier harvest. This suitably directed intervenient practice complies with the natural course of sunflower seed maturation. Sunflower seed reach the technological maturity, i.e., the final percentage and quality of oil, much sooner than the moisture content in seed and vegetative parts allows the combine harvesting (Robertson et al., 1978). A desiccation at the noment of technological maturity enables a combine harvest only 5-7 days after the treatment.

The development of diquate, the active ingredient of a preparation commercially called Reglone, enabled an efficient desiccation of a number of cultured crops, including the sunflower (Goulston et al., 1977; Degtyarenko, 1976; Palmer, Sanderson, 1976).

The objective of our study was to estimate the possibilities of a regular desiccation by Reglone of sunflower hybrids grown commercially in Yugoslavia.

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METHOD

Experiments were conducted in commercial plots in Vojvodina, a region of semi-humid climate.

The experiments included two variants:

1. Control, and
2. Reglone - 3 1/ha.

Reglone desiccations were performed by planes, using 60 1 of water per hectare. The time of Reglone application was between August 20 and 23, i.e., when the moisture content in sunflower seed reached approximately 35%. Experimental plots were harvested five days after the treatment, at the end of August. The earliest harvest of control plots took place between September 10 and 15. Effects of desiccation were examined on sunflower hybrid NS-H-62-RM. The analyses of residues were performed on this and an earlier hybrid, NS-H-27-RM.

Effects of Reglone desiccation were determined by a standard procedure of drying the samples to the constant dryness.

Sunflower seed yields were determined on the area of one hectare, reducing the moisture content of sunflower seed from both variants to 11% prior to the measurements.

RESULTS

Table 1 shows the effects of Reglone desiccation five days after the treatment.

TABLE 1

Efficiency of sunflower desiccation by Reglone

Variant	%-age of moisture			
	Seed	Leaf	Head	Stem
During treatment:				
Control	33.57	77.50	88.12	72.95
Five days after treatment:				
Control	26.04	52.40	71.34	72.00
Reglone - 3 1/ha	12.47	28.19	66.82	65.31

At the time of Reglone application, which coincides with full technological maturity of seed, all parts of sunflower plant had high moisture contents. Ine the treated variant, the moisture was reduced considerably in a short period of five days. Such an efficient moisture reduction allowed combine harvesting only a week after the treatment, even an extended storage without additional drying. Reglone application also reduced considerably the moisture content in sunflower leaves. Moisture reductions in the head and the stem were proportionally lower but nevertheless important and sufficient as to allow combine harvesting one week after the treatment.

In climatic conditions of Vojvodina, such favorable effects of desiccation allow combine harvesting of sunflower hybrids at least 10 - 14 days earlier than without desiccation. Besides, the sunflowers are more uniformly dried which makes the combine harvesting more productive and cheaper in the total balance. The practice also efficiently controls weeds in sunflower plots. It is an important additional effect because it increases the quality of harvesting and decreases the percentage of weeds on the agricultural land.

TABLE 2

Effect of Reglone desiccation on sunflower yields

Variant	Seed yield (10% moisture), q/ha		
	1977	1978	1979
Control	28.30	27.80	25.46
Reglone - 3 l/ha	29.78	29.00	27.86

Reglone desiccation, performed at the stage of full technological maturity, i.e., when the seed moisture was about 35%, brought higher seed yields in all test years. In favorable weather conditions, as were in 1977 and 1978, the Reglone application brought increases in sunflower seed yields of 1.5 q/ha. In unfavorable weather conditions, when the attacks by fungal diseases were more intensive, as was the case with 1979, a timely performed Reglone desiccation increased the yields of seed by 2.5 q/ha. The commercial value of the surplus seed obtained in the treated variants exceeded the costs of

Reglone application even in 1978 when the difference between the yields in treated and non-treated variant was smallest.

Table 3 shows the results of the analysis of diquate residues on sunflower seed treated with Reglone.

TABLE 3

Diquate residues on sunflower sedd

Hybrid	Diquate - ppm/% of moisture at the moment of treatment		
	35%	25%	15%
NS-H-62-RM	ND	ND	ND
NS-H-27-RM	ND	ND	ND

Detection limit 0.05 ppm

This analysis confirmed that diquate, being oil-insoluble, cannot be detected in sunflower oil. That is why there are no limits in Reglone application and there are no dangers in using the oil of treated sunflower for human nutrition. Furthermore, the results of the analysis showed that a late desiccation, at the seed moisture of 25 or even 15%, did not bring increases in diquate residues, regardless of the maturity group of sunflower hybrids treated.

The results of an analysis not included into this paper showed that Reglone desiccation, if performed timely and correctly, may bring increases in oil percentage of sunflower seed. However, this important effect requires additional analyses, including not only the percentage but also the details of the composition of oil, i.e., quality of sunflower seed.

The results of our preliminary study nevertheless show that the Reglone desiccation of sunflower hybrids has economical reasons for application in commercial production. It may contribute immensely to the solution of several major problems in sunflower production and processing. A particular importance of desiccation, as indicated by the above results, is that it allows the expression of yielding potentials of sunflower hybrids. Desiccation is economically important because it cuts down the costs of production - efficiently and uniformly dried sunflower crop, besides the desiccation of weeds, makes the work of combine harvesters more productive through the

savings on fuel and other expenditures. Furthermore, there are additional savings on fuel and equipment for sunflower seed drying.

The benefits from desiccation are emphasized in special conditions for sunflower growing, as later planting on hydromorphic soils, double cropping for seed, and the promotion of sunflower crop in mountain regions.

CONCLUSIONS

Reglone desiccation brings manyfold positive effects which contribute to the improvement of sunflower production.

There are economic reasons which encourage the inclusion of this practice into the commercial sunflower production.

LITERATURE

Ácimović, M. Sunflower trials for susceptibility and intensity of disease infection, Proc. 7th Int. Sunflower Conference, Krasnodar, 1976.

Degtyarenko, V. A. Preharvest desiccation of sunflower, Proc. 7th Int. Sunflower Conference, Krasnodar, 1976.

Goulston, H. G., Manley, A. C., Toburt, J. Reglone for sunflower desiccation: its application and toxicology, Conference on Sunflower Desiccation, Varna, 1977.

Kosovac, Z., Sudimac, V. Istrazivanje osnova za redovnu desikaciju suncokreta pred zetvu Reglonom, Proc. 7th Seminar on Plant Prot., Porec, 1976.

Nikolić-Vig, V., Skorić, D. Basic characteristics of newly developed Yugoslav sunflower hybrids and varieties, Proc. 7th Int. Sunflower Conference, Krasnodar, 1976.

Palmer, J. R., Sanderson, J. F. Canadian experience with the pre-harvest desiccation of sunflower with Reglone, Proc. 7th Int. Sunflower conference, Krasnodar, 1976.

Robertson, J. A., Chapman, J. R. Relation of days after flowering to chemical composition and physiological maturity of sunflower seed, The Sunflower Newsletter, № 1, 1978.