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EFFECT OF SOME COMBINED HERBICIDES  
UPON THE WEEDS PRESENT IN SUNFLOWER  
CROPS

Prometryn, linuron and other residual herbicides used in the chemical weed control at sunflower have no physiological selectivity. The use of such herbicides is sometimes accompanied by certain risks, especially when their application is followed by abundant rainfall (Sarpe and Ghinea, 1972; Sarpe and collab., 1973 a, 1973 b). Another negative side of these herbicides consists in the fact that reduced doses, presenting no toxicity danger to sunflower, are equally inefficient in the control of grasses.

In order to avoid such negative aspects I have studied - between 1971 and 1975 - the effect of other herbicides having a physiological selectivity to the sunflower plants. Besides the effects of trifluralin, butylat, nitroanilin and nitalin (presented at the Vth International Sunflower Conference - Sarpe and Tomoroga, 1975) I have also studied the effect of new herbicides based on metetilachlor, napropamid, propamide, terbuthylazine metrobromuron and chlorbromuron.

The trials were conducted in 1973 and 1975 on the medium leached chernozem from Fundulea having a humus content of 3.5%. The trials were carried out in 4 replications on the latin square with a plot surface of 25 sq m. The herbicides treatment was applied with portable sprayers, using 1000 l/ha. The following herbicides were applied: metetilachlor, prometryn, metobromuron, chlorobromuron, terbuthylazine, A-3812, metribuzin, napropamide, and pronamide.

The herbicide doses (kg/ha a. i.) is given in the Table. The application times of the herbicides is also indicated: ppi application before sowing with soil incorporation at the depth of 4-8 cm, and pre application immediately after sowing.

Some studies were carried out concerning the phytotoxic effect of the herbicides upon sunflower plants and the weeds, using the EWRC-scale quotations. The seed yield of each plot was weighed separately after harvesting.

Three major aspects were traced for each trial: (1) the selectivity degree of the different herbicides upon sunflower plants, (2) the herbicides effect upon the mono- and dicotyledonous weeds and (3) their effect upon the seed yield.

In 1974, the metetilachlor was perfectly well accepted by sunflower plants. No symptoms of phytotoxicity were revealed even at doses of 4 kg metetilachlor ha which is the double of the regular dose on chernozem-like soils. Promide and napropamide were also selective to sunflower. Very slight symptoms of phytotoxicity occurred in the variants treated with prometrin and metribuzin. Similar results were also obtained in the year 1975. Sunflower plants showed a relatively good tolerance to chlorobromuron, terbuthylazin and metobromuron, as compared to prometrin and metribuzin.

The prevailing herbicides on the soil from Fundulea were Sinapis arvensis, Setaria viridis, Setaria glauca, Echinochloa crus galli, Amaranthus retroflexus, Chenopodium album, Thlaspi arvense, Hibiscus ternatus, Digitaria sanguinalis, Lathurus tuberosus, Convolvulus arvensis and Cirsium arvense. Under such conditions, the herbicides based on metetilachlor, pronamide and napropamide, have reduced the degree of weed infestation only to a very little extent. By they had a very good effect upon grasses such as Setaria spp, Echinochloa crus-galli and Digitaria sanguinalis, with no effect upon Sinapis arvensis, Hibiscus ternatus and Thlaspi arvense.

The combination of metetilachlor with chlorobromuron, metobromuron, terbuthylazine and A-3812 increased the efficiency upon the dicotyledonous weeds, but not to a satisfactory degree. Using the same doses before and after

sowing, the efficiency was better in the case of after-sowing application. The soil incorporation diminishes the effects of chlorobromuron, prometryn, terbuthylazin, metobromuron and A-3812. The immediate after-sowing application, followed by abundant rainfall (as we had in 1973) guarantees a satisfactory effect of the respective herbicides upon the dicotyledonous weed-species resistant to metetilachlor. However, the best results in the perennial mono- and dicotyledonous weeds control were achieved in both experiment years at those trials where metetilachlor, napropamide and pronamide were mixed with metribuzin. The incorporation of this mixture in the soil at the depth of 4-8 cm secures a high efficiency in the weed control, regardless to the climatic conditions.

Data concerning the seed yield following various herbicidal treatments in the years 1974-1975 are given in the table. We can spot a close correlation between the seed yield and the herbicides efficiency. In both experimental years the variants treated with metetilachlor, pronamide and napropamide only, achieved the lowest yields (only 46-73% of the check I variant, harrowed 3 times) due to the resistant weed species. The sunflower yields increased considerably when the metetilachlor, pronamide and napropamide were mixed with metribuzin. Here, the yields were more than 90% of the check variant, harrowed 3 times. In the variants treated with metetilachlor mixed with chlorobromuron, terbuthylazine, metobromuron or A-3812, the sunflower yields were higher in the case when herbicides were applied after sowing, as compared to the same variants treated before sowing.

The herbicides metetilachlor, pronamide and napropamide proved very selective to the sunflower hybrid Romsun 52 on the medium leached chernozem from Fundulea. Chlorobromuron, metobromuron, terbuthylazin and A-3812 were better tolerated by sunflower, as compared to prometryn and metribuzin.

Table

## Sunflower Yield (Romsun 52 Hybrid) Following the Herbicide Treatment

I. C. C. P. T. - Fundulea, 1974

Treatment		Yield		
Herbicides <sup>x</sup>	Dose, kg/ha a.i.	Time of application	%	Difference, Significant kg/ha
Control I hoed 3 times	-	-	100	-
Control II not hoed	-	-	51	-1711
Prometryn	3.0	ppi	95	-149
Metetilachlor I	2.5	ppi	64	-1247
Metetilachlor	4.0	ppi	73	-956
Metetilachlor + chlorbromu-ron	2.0+2.5	ppi	94	-239
Metetilachlor + chlorbromu-ron	2.0+2.5	pre	98	-58
Metetilachlor / Metribuzin	3.7	ppi	92	-278
Pronamide	2.5	pre	57	-1492
Pronamide	2.5	ppi	63	-1285
Pronamide/metribuzin	2.6	ppi	93	-239
Napropamide	3.0	ppi	62	-1318
Napropamide/metribuzin	3.0	ppi	91	-310

<sup>x</sup>The plots treated with herbicides were not hoed

5.0%	536 kg
1.0%	710 kg
0.1%	918 kg

As far as the weed control is concerned, the herbicides metetilachlor and pronamide proved very efficient against Setaria spp., Echinochloa cruss-galli, Digitaria sanguinalis and Amaranthus spp. The species Sinapis arvensis, Hibiscus ternatus and Thlaspi arvense proved resistant to the three above-mentioned herbicides. The mixture of metetilachlor with chlorobromuron, metobromuron, terbuthylazin and A-3812 enlarged the weed-control range, but only in the case of pre-emergence treatments and under abundant rainfall conditions.

The best results in the mono- and dicotyledonous weeds control were achieved by the association of metetilachlor, pronamide and napropamide with metribuzin. The highest sunflower yields were also obtained with these treatments.

#### References

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