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THE INFLUENCE OF SOIL-CULTIVATION METHODS IN THE FALL AND SPRING ON THE YIELD OF OIL-SEED SUNFLOWER UNDER POLISH CLIMATIC CONDITIONS

In Polish soil-climatic conditions the best forecrops for sunflower are root-crops on farm-yard manure. In 1969/70, four experiments were carried out on the influence of various methods of soil cultivation on the yield of sunflower sown after potatoes. Four methods were compared: A - fall ploughing to the depth of 22 cm, B - spring ploughing to the depth of 18 cm, C - spring ploughing to the depth of 8-10 cm, D - no ploughing a disc harrow was applied in spring. All the experiments were carried out on a loamy sand.

In the experiments presented sunflower was sown by a spot drill at rows spacing of 60 cm and of 15 cm plants spacing in the row. Mineral fertilizers were applied at the dosages of 60 kg N, 60-80 kg P_2O_5 , 120 kg K_2O, per hectare. The results are presented in Table 1. The highest seed yield was obtained on the fall ploughing to the depth of 22 cm but it did not significantly differed from the yield at the spring ploughing to the depth of 18 cm. The lowest seed yield was on the treatment without ploughing, when in the spring only a disc harrow was applied.

Spring ploughing to the depth of 18 cm did not significantly decrease seed yield as compared to the ploughing to the depth of and 8-10 cm, and increased the yield by the same amount as against disc harrowing in spring. The manner of soil-cultivation to sunflower sown after potatoes had no significant effect on the fat content of its seeds.

Sunflower can be cultivated after frozen

Table 1

Influence of Various Soil-Cultivation Methods on the Yield and Seed Oil Content of Sunflower Cropped After Potatoes
(Mean for 4 experiments in 1969/70)

Manner of soil-cultivation	Seed yield, c/ha	Deviation, c/ha	Seed oil content
Autumn ploughing to 22 cm	22.6		47.4
Spring ploughing to 18 cm	21.0	-1.6	47.5
Spring ploughing to 8-10 cm	19.9	-2.7	47.1
Disc harrowing in spring	18.6	-4.8	47.4
LSD at P = 0.05	2.07		

winter rape. On numerous plantations of winter rape in Poland weeds are controlled by Treflan herbicide, and sowing spring cereals after winter rape is therefore risky. In 1970/71-1973/74, six experiments were carried out on the influence of various soil-cultivation methods on the yield of sunflower grown after frozen winter rape. The following treatments were compared: spring ploughing to the depth of 18 cm, spring ploughing to the depth of 8-10 cm disc harrowing (no spring ploughing). For winter rape the plot was ploughed to 22 cm. Pre-sowing cultivation was carried to the same depth in the experiment as a whole. For sunflower after potatoes mineral fertilizers were applied in the dosages of N_{60}, P_2O_5 - 60-80, K_2O - 120, and after winter rape the fertilization was N_{60}, P_2O_5 - 15, K_2O - 30 kg/ha. The check was sunflower cultivated after potatoes at fall ploughing to the depth of 22 cm. In the years when the experiments were carried out the winters were relatively mild and rape did not freeze out but it was destroyed before the outset of spring vegetation by Reglone applied at the dose of 3 kg/ha. The results are shown in Table 2. The seed yields from 3 experiments carried out on boulder loam did not show any statistically proved differences depending on the methods of soil cultivation. However in 3 experiments carried out on the loamy sand, when shallow spring ploughing or only disc harrow were applied in spring, the yields were significantly lower than after spring ploughing to the depth of 18 cm and in the check variant. Sunflower yield obtained in 6 experiments, regardless of the soil type, was significantly lower when spring ploughing to the depth of 8-10 cm or only disc harrowing was applied, than when the deeper soil-cultivation up to 18 cm was carried out. At the spring ploughing to the depth of 18 cm no excessive drying of the soil was observed. Neither the time nor the methods of soil cultivation influenced the oil content of sunflower seeds grown after winter rape.

Table 2

Influence of Soil-Cultivation Methods on the Seed Yield of Sunflower Sown After Frozen Winter Rape
(Mean for experiments in 1970/71-1973/74)

Soil-cultivation methods	Seed yield, c/ha	
	boulder loam	loamy sand
Ploughing at 22 cm (after potatoes)	25.0	17.7
Spring ploughing at 18 cm	25.2	17.5
Spring ploughing at 8-10 cm	24.8	15.1
Disc harrowing (no ploughing)	24.8	14.4
LSD at P = 0.05	Not significant	2.51
No. of experiments	3	3

Table 3

Influence of Various Depths of Fall Ploughing on the Oil-Seed Yield (Mean from 6 experiments in the years 1971/72-1973/74)

Depth of fall ploughing	Seed yield, c/ha	Seed oil content
15-16 cm	17.8	45.1
22-23 cm	19.1	45.5
22-23 cm + 7 cm sub-soil plough	19.0	45.5
LSD at P = 0.05	1.10	

In 1971/72-1973/74 six experiments were carried out on loamy sandy soil to study the influence of the depth of fall ploughing on sunflower yield. Three depths of ploughing were compared: A - 15-16 cm, B - 22-23 cm, C - 22-23 cm + 7 cm of subsoil plough. The results obtained are shown in Table 3. Sunflowe yield after fall ploughing to the depth of 22-23 cm was significantly higher than the yield after shallow ploughing to the depth of 15-16 cm. The deepening of ploughing by subsoil plough at 7 cm did not significantly increase the yield. The depth of fall ploughing had no effect on the oil content of seeds.

The results of these experiments carried out in different localities have shown that sunflower can be cultivated after frozen winter rape after spring ploughing to the depth of 18 cm. Fall ploughing to the depth of 22-23 cm for sunflower cropped after potatoes affords a higher yield than shallow fall ploughing to the depth of 15-16 cm or spring ploughing to the depth of 8-10 cm. The seed yield was the lowest when only disc harrowing was applied in spring. The soil-cultivation methods compared had no influence on the oil content of sunflower seeds.