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IMPROVED CULTURAL PRACTICES FOR SUNFLOWER HYBRIDS

We present you the experimental results revealing the efficiency of the rotation cropping system, fertilizers, soil tillage and the seeding time and density for certain sunflower hybrids. The trials were conducted on good fertility soils where the precipitations ranged between 480-560 mm/year.

The observance of crop-rotation practices at cultivating sunflower in Romanian conditions is prompted by a high frequency of the incidence of diseases, among which downy mildew (Plasmopara helianthi Novot) has proved to be the most dangerous.

When sunflower comes after itself, or within a short crop-rotation (at 2-4 year periods), an accumulation of the oospores (of the respective fungus) takes place, leading to a high frequency of the mildew attack and a considerably reduced yield (Table 1).

No oospores accumulation takes place within the 6-7 years crop-rotation, hence a reduced frequency of the mildew attack and no yield reductions. It is therefore recommended to cultivate sunflower in the same field not earlier than in 6 years (Table 2).

In the case of a fix-year interval the disease rate dropped sharply, with healthy plants accounting for 97.6% sick plants for 1.1% and plants suffering from the latent form of the disease accounting for 1.3%. These data emphasize once again the important role played by the crop-rotation system for securing proper phytosanitary conditions to the sunflower crop.

The new mildew resistant hybrids of course, different requirements regarding the crop

Table 1

The Correlation Between the Sunflower Share in the Crop-Rotation, the Frequency of the Mildew Attack (Visible Symptoms) and the Yield Obtained

Crop-rotation (years	Sunflower share (%)	Mildew-attack frequency, (%)	Yield, c/ha	%	Difference, c/ha
7	14	0.8	25.4	100.0	mt
6	17	1.3	25.2	99.2	-0.2
5	20	4.4	23.8	93.7	-1.6
4	25	8.3	22.7	89.4	-2.7
3	33	10.8	21.7	85.4	-3.7
2	50	13.0	19.6	77.2	-5.8
1	100	21.6	16.1	63.4	-9.3

Table 2

The Influence of the Crop-Rotation upon the Phytosanitary Conditions of the Sunflower Crop Considering the Mildew Attack Frequency (%)

Crop-rotation	Plants without visible symptoms of mildew attack, mycellium free, following the microscopic examination	Plants without visible symptoms but revealing fungus mycelium infestation, following the microscopic examination	Plants with visible symptoms of the mildew attack
Monoculture, 6 years	36.7	40.4	22.9
Monoculture, 3 years	52.8	26.0	21.2
Corn-sunflower	59.1	27.1	13.8
Peas-wheat-sunflower	72.7	17.3	10.0
Peas-wheat-corn-sugarbeet-corn-sunflower	97.6	1.3	1.1

rotation system. The data obtained from a 3-year crop-rotation reveal a reduction in the mildew attack frequency, due mainly to the genetic resistance of the hybrid.

Hybrid	Mildew attack frequency	Yield
HS 52 (non-resistant)	15%	22.8 c/ha
Sorem 80 (mildew-resistant)	1%	30.5 c/ha

The cultivation of mildew resistant hybrids is also recommended in crop rotations with a large proportion of corn, where the application of triazinic herbicides (having a negative residual effect upon sunflower) further restrains the freedom-degree of the sunflower crop within the respective-rotation.

Here, the sunflower yield can be influenced by the preceding crops, mainly during the dry years when, after certain crops (sugar beet, sunflower), the water reserve of the soil sharply declines. Fig. 1 presents the relationship between the water reserve in spring (the stage of 3 pairs of leaves) on the 0-150 cm level and the yield.

When sunflower is set after peas, corn and wheat it gives a higher seed and oil yield than after sugar beet or sunflower (Table 3).

The fertilizers influence was traced down on a number of soil types. According to the data obtained, the K-application brings no yield increases. The optimal soil temperature should be not lower than 8°C a negative correlation was observed between the seeds' high oil content and their germination in field conditions under low temperatures.

The low soil temperature extends considerably the duration of the time period between

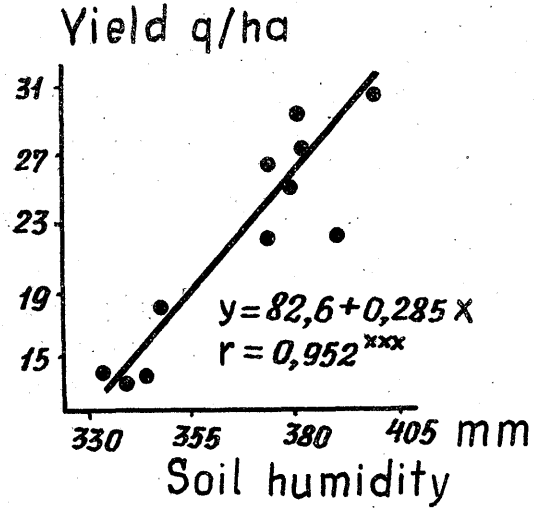

Fig. 1. The relationship between soil humidity (0 - 150 cm depth) and sunflower yield

Table 3

The Influence of Precursory Crops upon the Yield and Oil (%) in the Sunflower Seeds (6-year average). Fundulea

Precursory crop	Seed-yield, c/ha	Difference, c/ha	Oil-content (in seed), %
Corn	25.8	1.0	47.6
Wheat	24.8	Minimum	47.3
Peas	26.3	1.5	47.1
Sugar-beet	21.6	-3.2	45.5
Sunflower	19.3	-5.2	45.5

seeding and sprouting, reaching 35-36 days when we had a temperature of 2.9°C-3.2°C in the soil, as compared to 19 days when seeding at a soil temperature of 11.7-11.9°C.

The emergence of sprocets is delayed by 3-5 days, the proportion of sprouts decreases by 3-10% and the depth of planting seeds increases from 6 to 12 cm.

The long period between seeding and sprouting, due to lower soil temperatures and deeper seeding, resulted in the premature exhaustion of the seed reserves for some of the seedlings which, therefore, emerged weakened from the soil. The calculation carried out estabilished a very close correlation between the respective period and the number of weak plants emerged (r=0.950*-0.983**).

One of the factores affecting the seed germination at lower temperatures is the high oil-content of the hybrid seeds.

Analysing 72 seed samples with a varied oil content we concluded that the number of germinating seeds depends on their oil content, if the seeding was performed during a cold period.

A significant negative correlation between the field germinated seeds (%) and their oil content up to a critical temperature point (8°C air; 9°C-soil, within a 7-day post-seeding period on average), was estabilished on the basis of a statistical analysis. Above this temperature values, the correlation is insignificant or disappears altogether. Therefore, the specification of the optimum seeding time depends on a certain temperature both in the air and in the soil.

The determination of the optimum seeding density was carried out under various pedoclimatic conditions. If the seeding density increases from 30,000 to 50,000 plants/ha this brings no change in the yield level to the Rekord variety, but in hybrids this tends to increase

their yields. The peak of the hybrids' yield was observed at the density of 40,000-50,000 plants/ha.

Conclusions

1. It is necessary to sow sunflower in the same field within at least 6 years in order to avoid the intensive mildew attacks (Plasmopara helianthi Novot). As for the mildew-resistant hybrids, this period can be reduced, thus increasing the sunflower share in the crop rotation. The recommended precursory plants to sunflower are corn, wheat and, to a lesser extend, sugarbeet.

2. Fertilizers contribute to the sunflower yield increase with an optimum dosage of $N_{80}P_{40}$.

3. The recommended seeding depth is 6 cm.

4. The optimum seeding density, for the new hybrids, will range between 40,000 and 50,000 plants/ha.

The optimum seeding density is determined by a pre-seeding temperature of at least 8°C.