

V. Kondratyev,  
P. Semikhnenko, USSR

## PERIOD OF SUNFLOWER PLANTING AND ITS NOURISHMENT AREA

The opportunity of creating favourable conditions for the growth of young plants and weed control measures largely depends on choosing the right time for sunflower cultivation.

In previous years many experiments made in diverse soil-climatic zones of sunflower cultivation proved the expediency of its cultivation not at early but at average time following the massive appearance of seedlings and early weeds and the onset of soil "ripeness".

When planted into heated soil sunflower gives even sprouting on the 12-14 day. Early sowing during dragged-out spring gives belated and often thinned sprouts and makes weed control more difficult.

Sunflower was sown on clearer fields prior to early weed seedlings only in forest-steppe regions for account was taken of late maturing of plants cultivated at an average time, which complicates harvesting in some years. Average sowing time was also recommended on the fields heavily contaminated with annual weeds.

Additional experiments made in recent years showed that optimal conditions for timely and even sprouting and the formation of the maximum sunflower yield are at the soil temperature of 8 to 12°C (Table 1).

When sowing begins at 8-10°C of soil and ends at 12°C this perfectly meets the crop's biological requirements.

A long period of optimal sowing makes it possible to differentiate its choice depending upon field contamination conditions.

Optimal conditions to eliminate annual weeds are created when soil is heated to 10-12°C, which coincides with the appearance of mass seedlings

Table 1

Influence of the Sowing Period on Sunflower-Seed Yield, c/ha

Sowing at soil temperature, °C	VNIIMK 1967-1973	Experimental stations				
		Armavirs-kaya 1969-1971	Donskaya 1967-1971	Moldavs-kaya 1969-1971	Belgorodskaya 1967-1971	Kazakhs-kaya 1967-1970
6-8	26.0	21.0	18.2	22.0	17.4	19.8
8-10	26.7	21.8	18.5	22.9	16.6	22.3
10-12	27.0	21.6	18.8	-	-	22.7
12-14	26.8	21.2	18.6	22.4	15.5	22.0
14-16	24.7	-	-	20.9	14.5	23.0

of early weeds. To sow sunflower at this time is recommended on heavily weeded fields, on which pre-sowing tillage eliminates 80-90% of weeds. Sunflower is rooted before the massive sprouting of late weeds at the soil temperature of over 14°C. This makes it possible to harrow seedlings and together with other mechanical means almost to do away with weeds.

If sunflower is cultivated at the beginning of the optimal time early weeds are not killed completely by presowing tillage. Their seedlings come out as a rule before sunflower sprouts or simultaneously with them. At this time early weed seedlings cannot be killed by mechanical means because even harrowing by light harrows at this phase thins sunflower very much harrowing is possible when sunflower forms the first pair of real leaves, but early weeds and some of late ones are heavily rooted and, therefore, harrowing is not effective. Planting sunflower into the soil heated to 8-10°C (at the beginning of an optimal time) can therefore be recommended provided there are high crop-farming efficiency and effective soil herbiciding.

To create favourable conditions for the growth and formation of high sunflower yields it is no less important to determine the optimal plant nourishment range facilitating the maximum soil fertility use.

To supply plants with moisture in the zone of unstable and deficient moistening is the prime condition determining the optimal plant nourishment range. Intensive plant growing is indispensable for high yields. However, given powerful growth and density of crops limited soil moisture reserves are used during the first half of vegetation to develop the plant vegetative mass, while at the seed growth and formation stage plants often suffer from water shortage. Thus, in choosing the optimal plant nourishment range it is recommended to proceed from spring water reserves in the soil.

Proceeding from experimental data and sunflower cultivation conditions in the main soil-climatic zones, it is recommended to leave the following number of plants per hectare: 40-50,000 when soil is watered at the depth of 2.5-3 m; 30-40,000 when soil is watered at the depth of 1.5-2 m and 20-30,000 when it is watered at the 1 m depth (Table 2).

Table 2

Recommended Plant Density in Sunflower  
Cultivation Key Zones in the USSR

Zone and soil	Plant quantity, 000'/ha
<u>European part</u>	
1. Moistened forest-steppe and adjoining steppe regions, deep, precaucasian, leached, lowly leached and podzolic chernozems	40-50
2. Semi-draughty steppe - ordinary and precaucasian calcareous chernozems	30-40
3. Draughty steppe - Southern chernozem and dark-brown soils	20-30
<u>Asian part</u>	
4. Southern forest-steppe and semi-draughty steppe - rich, ordinary and southern chernozems	30-40
5. Draughty steppe-southern, dark-brown and brown soils	20-30

Since sunflower has a powerful root system covering a considerable soil volume, it responds weakly to a change in the nourishment area form. Many years of experiments show that sunflower forms approximately the same seed yield at 70

and 90 cm row-spacing in deficiently moistened zones.

A seed yield increase in square-cluster sowing with broadened row-spacing is explained by improved mechanical tending of crops which makes it possible to kill more weeds. Under enhanced farming efficiency point sowing has all advantages because it allows for a more even plant spacing in the area.

Reduced row-spacing does not give positive results in normal conditions because it makes weed killing more difficult. However, in the fields cleared from weeds due to the application of tréphlane or hand weed control the largest seed yield forms at single placing of an optimal number of plants with the row spacing of 45-50 cm.

In V. Pustovoit's experiments made in 1912-1922 the seed yield was 18.5 c/ha with sunflower density of 52,600 per hectare at the nourishment range of 71x27 cm, and 20.5 c/ha at the range of 53x35 cm. Between 1964 and 1967, in the Voronezh experimental station the seed yield was 21.0, 21.7, 22.9 and 22.5 c/ha at sunflower density of 40-45,000 per hectare and at row-spacing 102, 90, 70 and 45 cm, respectively. In our experiments in 1974-1975 the seed yield was 34.2 c/ha at sunflower density equalling 40,000 per hectare and at row-spacing 70 cm and 37.3 c/ha at that of 45 cm.