T1978AGRO05

CONTRIBUTION OF NEWLY DEVELOPED NS-HYBRIDS TO THE INCREASE AND STABILITY OF SUNFLOWER PRODUCTION IN YUGOSLAVIA

By

Vida Nikolic-Vig
Faculty of Agriculture Novi Sad
Institute of Field and Vegetable Crops
Novi Sad, Yugoslavia

Summary

In 1977, domestic sunflower hybrids were commercially grown in the country for the first time. Excellent results were achieved, as can be seen from the results of large-plot trials and the commercial production. The average seed yield in 1977 was highest for the period of the last 15 years in Vojvodina, the main sunflower-growing region of Yugoslavia. This success was the result of growing NS-hybrids on almost 90% of the area under sunflowers. The average seed yield in 1977 in Vojvodina was 26.3 mtc/ha for the total area under sunflowers (145,000 ha).

A turning point in sunflower production of Yugoslavia took place in 1977 when newly-developed NS-hybrids started to be grown in commercial production. When analyzing statistics on sunflower seed yields in Yugoslavia, it should not be overlooked that the production year of 1977 was preceeded by the 15-year period (1962-1976) during which Soviet sunflower cultivars were exclusively grown. The introduction of these cultivars in 1961 successfully solved in the first several years of their growing the problem of oil yield increases per area unit and, due to their resistance to Orobanche cumana Wallr., eliminated the possibility of infestation by this parasite which had offered serious problems to the previously grown domestic cultivars. In the 15-year period, the average seed yield of the cultivars VNIIMK 8931 and Peredovic grown in Vojvodina, the principal sunflower-producing region of the country, was 18.5 mtc/ha. Although this was a relatively high average yield in relation to the yields obtained in other countries, these cultivars could not maintain high and stable yields. There were considerable oscillations in the last 10 years when the yields ranged from 13.9 mtc/ha (1970) to 20.7 mtc/ha (1973). In our ecological conditions, these cultivars became susceptible to dominant diseases and had much lower yields than the long-term average in the years in which the precipitation, relative air humidity, and air temperature favored the development of diseases. A sudden rise of the average seed yield to 26.3 mtc/ha on the area of 145,000 ha under sunflowers in 1977 was the result of the introduction of newly-developed NS-hybrids in about 90% of the area.

The result of a long-term work on sunflower breeding at the Institute of Field and Vegetable Crops in Novi Sad was the development of 10 single cross sunflower hybrids based on male sterility. Having been tested in a network of trials, these hybrids were introduced into the commerical production in 1977 in 90% of the area under sunflowers and they brought excellent results. The

advantages were mostly expressed through increased seed yields, resistance to downy mildew, uniform maturation, and uniform moisture of seed suitable for storage. The value of these hybrids may be illustrated by numerous examples from the commercial production as well as by the results of varietal trials. In this paper, only the most prominent results will be dealt with.

Results From the Commercial Production

At the agro-industrial combines of Vojvodina, at which sunflowers are grown at 10-15% of the total arable land, excellent results were achieved in 1977 by planting NS-hybrids. Table 2a gives the results of sunflower production at seven combines at which high average yields were obtained, ranging from 33.3 mtc/ha at 1,225 ha at the combine Becej to 27.3 mtc/ha at 11,163 ha at the combine Zrenjanin. The above figures stand for the entire area under sunflowers at the combines. In certain plots at the combines, however, record seed yields were obtained. For example, the yield of 44.5 mtc/ha was obtained in a 60 ha plot at the combine Klek. To compare NS-hybrids with the previously grown cultivars, we shall mention that the cultivars VNIIMK 8931 and Peredovic were grown in 1977 at the combine Sombor at 2,200 ha to obtain the average yield of 25.04 mtc/ha; NS-hybrids were grown at the same combine at 2,050 ha to obtain the average yield of 31.62 mtc/ha.

Among the individual farmers, a farmer from Banatska Topols obtained 45.3 mtc/ha at his plot of 0.6 ha, another farmer from Zitiste 43.5 mtc/ha at the plot of 4.4 ha. These record yields clearly show that the genetic potentials for seed yield of these hybrids are much higher than those of sunflower cultivars.

Results of Large-Plot Varietal Trials Performed in Vojvodina in 1977

The new NS-hybrids were included into a network of trials conducted in all sunflower-growing regions of Yugoslavia in 1975. These regions have different agroecological conditions. The Soviet cultivars VNIIMK 8931 and Peredovic were comparatively tested in these trials -- they were used as the control. In this paper we shall give the results of seed yields obtained in 1977 in large-plot trials conducted in the three regions of Vojvodina -- Srem, Banat, and Backa.

The results obtained in the trials illustrate the advantages of NS-hybrids over the cultivars, their higher genetic potentials for seed yield and genetic resistance to downy mildew. Table 3 gives the seed yields of the four hybrids which are highest yielding and are grown at the largest area: early hybrids NS-H-26-RM and NS-H-27-RM, and medium-early hybrids NS-H-62-RM and NS-H-63-RM. These hybrids had significantly higher seed yields than the control cultivar VNIIMK 8931. Their yields were higher by 19-27%, depending on the hybrid.

The hybrid NS-H-26-RM was the highest yielding in the network of large-plot trials conducted in Vojvodina. Its vegetation period was shorter by 10 days in relation to the vegetation period of VNIIMK 8931; in our production

conditions. Its stem height did not exceed 170 cm. This hybrid was also found to be the most adaptable among the NS-hybrids.

The hybrid NS-H-27-RM had the highest oil content among the NS-hybrids. In some localities of the network, its oil content exceeded 55% (in absolutely dry seed). This hybrid is similar to NS-H-26-RM in vegetation period and plant height.

The main character of the hybrid NS-H-62-RM is its high potential for seed yield. It had the record yield in commercial production in 1977 -- 44.6 mtc/ha at 60 ha plot (the combine Klek). In the network of trials in Vojvodina, it had the seed yield higher by 25% than the control cultivar. Its vegetation period approaches those of the Soviet cultivars grown in Yugoslavia and its plant height ranges from 160 to 180 cm.

The hybrid NS-H-63-RM has a higher genetic potential for seed yield and oil content in seed than the hybrid NS-H-62-RM. The vegetation periods and plant heights of the two hybrids are similar.

This year, NS-hybrids were planted in Vojvodina at 200,000 ha, or 100% of the area under sunflowers. In our opinion, the development and distribution of NS-hybrids mark a new stage in sunflower growing in Yugoslavia during which an increased and more stable production should be ensured.

TABLE 1. Seed Yields of Sunflowers

Year	Vojvodina ha	Vojvodina mtc/ha	Yugoslavia mtc/ha	Europe mtc/ha
Average:	1952-1961	12.3		
1962	79.000	20.0	16.5	11.4
1963	88.000	19.3	16.4	11.7
1964	102.000	20.6	17.8	12.3
1965	107.000	19.3	16.7	12.4
1966	106.000	20.2	18.2	14.5
1967	118.000	18.3	17.0	9.3
1968	118.000	21.1	19.2	9.5
1969	169.000	18.8	17.8	15.7
1970	144.000	13.9	13.6	13.5
1971	134.000	20.5	19.0	14.0
1972	122.000	18.0	16.2	13.8
1973	167.000	20.7	19.3	14.3
1974	148.000	15.6	14.9	11.6
1975	129.000	14.4	14.0	10.9
1976	118.000	20.0	18.3	11.8
1977	145.000	26.3		
Average:	1962-1976	18.5		

TABLE 2A. Top Producers of Sunflowers in 1977

	Town	Agro-industrial Combine	Hectares	Yield in mtc/ha
1.	Becej	"Agrobecej"	1.225	33.3
2.	Subotica	"Agrokombinat"	1.566	32.3
3.	Pancevo	"Tamis"	4.363	29.8
4.	Kikinda	"Banat	2.881	28.6
5.	Srem. Mitrovica	"Sirmijum"	8.831	28.6
6.	Sombor	"Sombor"	4.260	28.3
7.	Zrenjanin	"Servo Mihalj"	11.163	27.3

TABLE 2B.

1.	Klek	"Servo Mihalj"	60	44.5
2.	Dobrica	"Tamis"	10	41.2
3.	Djurdjevo	Poljopr. zadruga	60	41.0
4.	Lovcenac	"Njegos"	90	40.7
5.	Topola	"Panonija"	46	40.0
6.	Stapar	"Sombor"	18	39.9
7.	Stara Pazova	"Sirmijum"	61	39.9
8.	Ruma	"Sirmijum"	75	39.6
9.	Bikovo	"Agrokombinat"	223	39.2
10.	Novo Selo	"Agrobecej"	90	39.0

TABLE 3. Average Seed Yields in mtc/ha Obtained in Large-Plot Trials in Vojvodina - 1977

No.	Cultivar	mtc/ha Srem	Banat	Backa	Average	Relative Yield %
1.	VNIIMK 8931, Control	28.93	26.88	29.11	28.30	100
2.	Peredovic	30.17	26.29	28.52	28.32	100
3.	NS-H-26-RM	36.58	34.94	36.38	35.96	127
4.	NS-H-27-RM	33.46	33.72	34.08	33.75	119
5.	NS-H-62-RM	36.55	34.43	35.56	35.53	125
6.	NS-H-63-RM	35.45	34.19	36.90	35.51	125