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SOVIET SUNFLOWER VARIETIES IN REPUBLIC OF GUINEA. STUDIES OF MANAGERIAL PRACTICES

In 1969-1971 we have conducted comparative trials of Soviet sunflower varieties and studies of plant density, fertilization, and planting pattern of this crop under conditions of Republic of Guinea.

Trials were conducted in the Middle Guinea on ferralytic mean loamy soils with the following properties: humus content in the 0-25 cm soil layer by the Turin method - 1,65%; total nitrogen - 0.087%, P_2O_5 after Arrenius - 8.4; K_2O after Peive - 10.2 mg/100 g of dry soil, pH (KCl) - 4.7, hydrolytic acidity after Kappen - 3.8 m-eq.

The size of plots was 50 sq.m in four replications.

The following varieties were included into trials: Peredovik, Smena, VNIMK 6540, Armavirsky 3497, Yenissey, Krasnodarets, and Armavirets, all of them obtained from the All-Union Research Institute for Oil Crops. In all other studies the Peredovik variety was used.

Varietal trials and studies of nutritive area and plant density of sunflower were conducted on fertile soil. Fertilization was effected three times: during the first discing 15 t/ha of manure $+N_{30}P_{50}K_{50}$ and 2 t/ha of lime; during the first and second fertilizing - $N_{30}P_{20}K_{20}$ each time.

Studies of fertilization at the dose of 60 kg of active matter per 1 ha before planting included $N_{30}P_{40}K_{30}$ and at the phase of second pair of leaves $N_{30}P_{20}K_{30}$. The dose of 90 and 120 kg of active matter was applied three

times: before planting 30 and 40 kg of nitrogen, respectively, 50 kg of phosphorus and potassium and at two phases: at the second pair of leaves and before head formation, 30 and 40 kg of nitrogen, 20 kg of phosphorus and potassium per ha in accordance with the scheme of experiment. All variants each year received 2 t/ha of lime.

In varietal trials and when studying the impact of fertilizers on sunflower productivity strip planting was used at 70 x 40 cm.

During the vegetation period in the years of studies the mean daily air temperature was 22.2-22.9°C and total precipitation was 870-1009 mm. During the years of studies weather conditions were in general favourable for high sunflower yields.

Studies have shown that tested varieties differed in the length of vegetation period, height of stalks and productivity (Table 1).

The weight of 1000 seeds and the weight of head were the largest in late varieties. The largest weight of 1000 seeds (83 g) was shown by variety VNIIMK 6540 and the largest seed weight of the head was in Peredovik (91 g); the least weights were in Armavirets 61 and 70 g, respectively. Peredovik was the most productive variety, giving the largest mean yield for three years (12.9 c/ha), due to high seed yield and high oil content. VNIMMK 6540 and Smena were close to it in productivity. Their oil yield was lower than that in Peredovik by 9.4 and 17.3%. Armavirets, Yenissey and Krasnodarets were less productive.

All studied varieties were characterized by relatively high oil content of the seeds (40.1 - 54.3%).

Under conditions of Guinea the studies have shown that at high densities plant development was retarded, as well as the height of plants, the weight of vegetative mass, the size and productivity of heads. The most powerful plants with the largest heads were obtained at densi-

Table 1
 Growth and Development of Plants, Seed Yield and Oil
 Content in Different Sunflower Varieties (average for
 1969-1971)

Variety	Veget. period days	Pl. height cm	Seed weight from one head, g	Weight of 1,000 seeds, g	Seed yield, c/ha.	Husk, %	Oil content, %	Oil yield, c/ha
Armavirets	79	168	70	61	25,2	22,1	42,4	9,3
Yenissey	78	175	74	66	26,4	27,3	40,1	9,3
Krasnodarets	80	170	72	63	26,4	25,5	43,2	9,8
VNIIMK 6540	86	200	86	83	30,9	25,2	43,7	11,8
Armavirsky 3497	87	204	78	73	28,1	23,5	44,3	10,8
Smena	87	202	81	65	29,3	25,7	44,8	11,0
Peredovik	88	196	91	81	32,8	24,4	45,3	12,9

ties of 70 x 70 cm with one plant in the hill and at the strip planting of 70 x 50 cm. At this pattern of planting the plant height was 202 and 201 cm, plant weight 1217 and 1105 g, head diameter 24.8 and 23.6 cm, seed weight from the head 122 and 103 g, and 1000 seed weight 92 and 84 g. Increase of density from 20,000 to 50,000 plants per hectare at square-hill planting and from 30,000 to 60,000 plants per hectare at strip planting with 70 cm between the rows reduced the weight of 1,000 seeds and their yield from one head by 25 and 61 g, 20 and 56 g, respectively. The best planting pattern for sunflower to obtain seed yield should be therefore square-hill 70x70 method with one plant in the hill, or strip planting 70x50 with the nutritive area of 0.49 and 0.35 sq.m, respectively. In this case large heads are formed with large seeds, and their yield from one head is increased.

Plant density definitely influenced the seed yield and quality (Table 2).

When plant density increased from 20,000 to 50,000 plants per hectare at square-hill planting and from 30,000 to 60,000 plants per hectare at strip row planting the husk percentage of seeds reduced by 1.2 and 1.7% respectively and the seeds' oil content increased by 0.3 - 1%. The highest oil percentage (45.6%) was observed at strip planting when plant density was 60,000 plants/ha.

At equal plant densities strip planting gave higher yields of seed and oil than square hill planting. The highest seed yield - 35.5 c/ha - and oil yield - 13.9 c/ha - were observed at strip planting pattern of 70 x 35 cm with the plant density of 40,000 plants/ha.

Fertilization with manure at the rate of 20 t/ha + N90 P90 K90 increased the mobile forms of nutritive elements in the soil thus favouring growth, development and yield formation. Under the influence of fertilizers plants became higher and accumulated more organic matter, while the elements of yield improved

Table 2
 Planting Pattern and Plant Density in Relation to Growth,
 Yield and Seed Quality in Sunflower (average for
 1969-1971)

Planting pattern, cm	Plant density, 1000/ha	Plant weight, g	Seed weight from one head	Weight of 1,000 seeds	Seed yield, c/ha	Husk, %	Oil in seed, %	Oil yield, c/ha
70 x 25	60	793	47	64	28,2	23,9	45,6	11,1
70 x 30	50	934	65	70	32,4	24,4	45,4	12,7
70 x 35	40	1015	88	77	35,5	24,8	45,1	13,9
70 x 50	30	1105	103	84	30,8	25,6	44,6	11,9
70 x 70	50	883	61	67	30,6	24,1	45,3	11,8
70 x 70	40	981	83	75	33,7	25,2	44,9	13,1
70 x 70	30	1085	97	81	29,3	25,0	44,8	11,3
70 x 70	20	1217	122	92	24,6	25,3	45,0	9,6

Table 3
Fertilization in Relation to Plant Growth, Sunflower Seed Yield and
Quality (average for 1969-1971)

Variants	Plant height, cm	Plant weight, g	Seed weight per head, g	1000 seed weight, g	Seed yield, q/ha	Oil in seed, %	Oil yield, q/ha
No ferti- zers (check)	140	568	61	71	20,3	43,8	7,7
N60	178	800	81	77	27,2	43,1	10,0
N60 P60	181	851	90	80	29,9	44,4	11,5
N60 P60 K60	183	873	96	82	31,9	44,8	12,4
N90	185	902	88	80	28,9	42,9	10,8
N90 P90	189	960	99	83	33,0	44,6	12,8
N90 P90 K90	192	991	104	84	34,5	45,1	13,5
N120 P90 K90	202	1035	101	83	33,5	43,3	12,5
Manure 20 t/ha	173	782	80	78	26,5	44,2	10,2
Manure 20 t/ha + N90 P90 K90	200	1150	111	85	36,8	44,7	14,2

because of the growing seed number in heads and 1000 seed weight.

Fertilization assured higher seed and oil yields (Table 3). On average for three years the gain was 6.2-16.5 c of seeds and 2.3-6.5 c/ha of oil. The highest productivity was observed under full fertilization accompanied with manuring. This variant gave 1.8 times more seed and oil yields for three years of studies compared with the check.

Seed and oil yields after nitrogen fertilization at the rate of 60 kg/ha of active matter increased by 6.9 and 2.3 c/ha, respectively. Addition of P and K fertilizers further increased sunflower productivity. Higher rates of mineral fertilizers increased seed and oil yields by 50% more nitrogen fertilization at P90 K90 reduced the seed and oil yields compared with the variant N90 P90 K90.

Fertilizers slightly reduced huskness.

Results of studies suggest that under soil and climatic conditions of the Republic of Guinea sunflower crop behaves quite well and adequate agronomic practices can help obtain sufficiently high seed and oil yields. The highest sunflower productivity is obtained with the strip planting pattern of 70 x 35 cm at the plant density of 40,000 plants/ha.

Fertilizers, especially full mineral fertilizers combined with manuring (20 t/ha)+(N90 P90 K90) on verralytic soils create favourable conditions for vegetative growth, formation of the productive part of plants and as a result for high seed and oil yields.