G.K. Lgov, USSR

SUNFLOWER IRRIGATION AND FERTILIZATION IN FOOTMOUNTAIN PLAINS OF THE NORTH CAUCASUS

The soil-climatic conditions on the footmountain plains of the North Caucasus are favourable for sunflower cultivation. Sunflower prevails in the arable area structure mostly in the second and third zones of the Kabardino-Balkar, North Ossetian and Checheno-Ingush Autonomous Republics.

The second zone is marked by deficient moistening and for the most part has dark-brown soils, while meadow black soils prevail in floodlands. Carbonate chernozem prevails in the third zone of unstable moistening.

In arid conditions sunflower cropping capacity in the zones is unstable and varies from 3.5 to 18.0 c/ha depending upon the extent of drought.

Sunflower responds to the natural soil fertility, irrigation and fertilization. The influence of irrigation and fertilization on sunflower seed yield is sufficiently fully described in the studies conducted in diverse soil-climatic zones on the footmountain plains. The collated yield data point to the high efficiency of irrigation in the zones concerned.

Sunflower seed yield addition from one reserve irrigation amounted to 3.0-6.0 c/ha on non-fertilized ground and 4.3-5.0 c/ha on fertilized ground. Reserve irrigation on irrigated lands with the cailloutis layer close to the surface is little effective due to the small moisture retention capacity of the soil.

The increase in the lower level of soil moistening brings about a noticeable increase in seed yield. Higher additions (8.5-8.9 c/ha on non-fertilized ground and 11.6-11.9 c/ha on fertilized ground) were obtained on the irrigation regime

variant under which moistening in the 1 m soil layer did not drop below 80% of field moisture capacity during the plant vegetation period. The increase in the lower soil moistening level enhances fertilizer efficiency. In the variants without irrigation and with one reserve irrigation seed yield addition from fertilizer totalled 1.4-2.5 c/ha against 4.5-6.5 c/ha in the variant with three reserve irrigations (up to 80% of field moisture capacity).

In the irrigated variants sunflower total water consumption increases as compared with the non-irrigated variants, reaching the maximum in the 80-80-80% FMC variant, while water consumption coefficients are diminishing.

Fertilization facilitates more economical water expenditure per seed yield unit. While total water expenditure is roughly similar in non-fertilized and fertilized variants, water consumption coefficients are considerably smaller due to higher seed yield in the fertilized variants. Maximum water expenditure occurs during head formation and flowering periods, amounting to 67-75% of the total.

Irrigation and fertilization positively affected head plumpness, absolute weight, huskness and seed oil content.

In the 80-80-80% FMC irrigation regime grain emptiness decreased by 4.8-24.6% huskness by 1.0-2.7% as compared to the non-irrigation variant; seed oil content increased by 1.5-3.2% and oil yield by 3.6-4.9 c/ha. Fertilizer also somewhat reduce grain emptiness, huskness and seed oil content (the third zone). The maximum oil yield (14.9-15.0 c/ha) was obtained in the fertilized variant at the 80-80-80% FMC irrigation regime, which is 90-92% more than the variant without irrigation or fertilization.

We found that in averagely dry years the most acceptable irrigation regimes are: in the second zone on dark brown and meadow black soils reserve irrigation (1000-1300 m^3/ha) and 3-

4 seasonal irrigations (600-800 m^3/ha); in the third zone on carbonate chernozem a reserve irrigation (1200 m^3/ha) and 2-3 seasonal irrigations (700-800 m^3/ha). On irrigated soils bedded by the cailloutis layer at the depth of 40-60 cm it is recommended to employ preplanting reserve irrigation (400-600 m^3/ha) and 3-4 seasonal irrigations (400-500 m^3/ha). In averagely humid and humid years the number of seasonal irrigations should be decreased by one or two. Under fertilization the more effective doses (kg/ha of acting substance) for sunflower are $N_{60}P_{90}$ on meadow black soil and $N_{90}P_{90}$ on carbonate chernozem soil.

The experimental results point to the high efficacy of growing sunflower on irrigated soils of the footmountain plains in the North Caucasus, which is borne out by high seed yield, net income and profitability.