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FERTILISERS' EFFECT ON THE DURATION OF SUNFLOWER ORGANOGENESIS STAGES UNDER IRRIGATION (SMOLNICA SOIL)

No studies have yet been made in this country of the effect of mineral fertilisers on the duration of the organogenesis of the Peredovik and VNIIMK 8931 varieties under irrigation on the Smolnica soil. In other countries, too, there are no sufficient data on this problem, as a review of the available literature shows.

A.K. Kuperman (1962) was the first to demonstrate that sunflower passes through twelve stages of organogenesis in the process of its intogenesis. She identified the shaping organs and divided the organogenesis process into stages when vegetative organs are shaped and stages when generative organs are shaped.

Our research was centred on testing the effect of nitrogen, phosphorus and potassium and their combinations on the duration of the organogenesis stages under irrigation on the Smolnica-type soils.

The research was conducted in 1972 and 1973 at the Pec Biotechnical Institute at the regional experimental station in the town of Pristin. The method used was that of an accidental location of plots in five replications with the Peredovik and VNIIMK 8931 varieties, according to the following scheme:

1. Check variant, 2. N100, 3. P100, 4. K100, 5. N100P136, 6. N100K200, 7. P136K200, 8. N100P100K100, 9.N100P200K100, 10. N200P100K100, 11. N100P100K160, 12. N100P136K200, 13. N150P136K200, 14. N100P170K200, 15. N100P150K200, 16. N150P170K200.

The area of one plot was 40 m^2. The distance between rows was 70 cm and in a row between plants 30 cm. 200 plants were left on one plot, which made up 47,600 plants on one hectare. The sowing was done by hand on April 1, 1972 and April 26, 1973. Sprinkler irrigation was used. Soil moistening was maintained at the level of some 70% of the TFM. The beginning and end of each stage was controlled according to Kuperman's method. The experimental field was harvested on 10 to 15 September.

The research showed that nitrogen and potassium have the greatest effect on the duration of the first and second stages of the organogenesis in both varieties. It was also noted that nitrogen accelerates the development of the vegetation pyramid in the Peredovik and VNIIMK 8931 varieties, owing to which the plants made the earlier transition to the stages of the differentiation of the generative organs on the soil fertilised with nitrogen only. It was also found that the first and second stages of the organogenesis were the longest in the Peredovik in Nos. 11 and 12 variants (27 days). The third stage was the longest in the Peredovik variety in the second variant (16 days), and the shortest in the third and fourth variants. Similar results were obtained in the VNIIMK 8931 variety. When fertilisers were combined the third stage was the longest in the eighth variant of the Peredovik variety (17 days). The analysis of the effect of nitrogen, phosphorus and potassium, applied separately, on the duration of the fourth stage of the organogenesis of the Peredovik variety revealed that phosphorus and potassium had the greatest effect. When phosphoric fertilisers were applied alone the fourth stage took 11 days and when different fertilisers were combined the fourth stage was the longest in the fifteenth variant (14 days). Similar results were also obtained for the VNIIMK 8931 variety.

The flowers' rudiments in the heads are differentiated and take shape in the fifth and sixth stages. If we are to analyse the effect of nitrogen, phosphorus and potassium, applied separately, on the Peredovik variety we will see that the fifth stage was the longest in the third variant (16 days). When no fertilisers were applied the fifth stage took 12 days, four days less than the third variant. In the other variants the fifth stage was the longest in the ninth variant (18 days). Similar results were also obtained for the VNIIMK 8931 variety. Nitrogen, phosphorus and potassium produced nearly the same effect on the duration of the sixth stage of both varieties. The influence of phosphorus was the most potent on the duration of the seventh stage, which was the longest in the two varieties in the tenth variant (eight days). In the other variants higher dosages of mineral fertilisers decreased the duration of the seventh stage of the organogenesis.

In Peredovik and VNIIMK 8931 the duration of the eighth stage was greater in the variant when nitrogen or phosphorus were applied alone. As compared to the variants when one element was applied the non-fertilised variant passed into the next, ninth stage three days earlier. The other variants had minor differences.

The ninth stage was the longest in Peredovik and VNIIMK 8931 in the variant when nitrogen alone was applied. Among the other variants Variant 14 produced the most potent effect on this stage.

The tenth stage was the longest in the variant when phosphorus alone was applied. Of the other variants the greatest effect on the duration of the tenth stage was produced by variants in which the ratio between nitrogen, phosphorus and potassium was 1:1:1.

When fertilised by one nutritious element the 11th and 12th stages in both varieties were the longest in the nitrogen variant.

Phosphorus and potassium produced the same impact, though it was less significant. When mineral fertilisers were combined they exerted the greatest influence on the duration of the 11th and 12th stages of the organogenesis in the 12th and 13th variants. These stages were longer in the VNIIMK 8931 variety in all stages than in the Peredovik variety. This can probably be attributed to the specific features of this variety.

The results obtained in the sunflower experiments under irrigation prompt the conclusion that intensive fertilisation has an effect on the prolongation of all stages of the organogenesis as compared to the non-fertilised variants. The link has been found between the duration of the first and second stages of organogenesis and the number of leaves. Insofar as the plants are primarily supplied with a sufficient quantity of nitrogen at these initial stages, the second stage is longer and this makes it possible to exert a positive influence on the harvest owing to the shaping of a greater number of leaves. The same pattern was in evidence between the duration of the third and fourth stages of the organogenesis and the seed yield.

Conclusion

Our investigations conducted on the Smolnica-type soils under irrigation have prompted the following conclusions:

1. In both varieties nitrogen and potassium have a greater influence on the duration of the first to ninth stages of the organogenesis. Phosphorus produced the greater influence on the duration of the ninth to twelvth stages by reducing their duration and accelerating the plants' ripening.

When phosphorus dosages were increased the ripening was quickened by four to eight days in both varieties.

2. Intensive fertilisation under irrigation increases the duration of all stages of organogenesis, with the duration of the third and fourth stages having the greatest impact on the seed yield. Higher seed yields were observed in all the variants in which these stages were the longest.

3. Nitrogen accelerates the development of the vegetation pyramid owing to which sunflower made on earlier transition from the stages of differentiation of vegetative organ to that of differentiation of generative organs on plots fertilized with nitrogen only or where nitrogen was applied in higher dosages. Phosphorus and potassium showed down this transition.

4. These is a direct correlation between the duration of the first and second stages of arganogenesis and the number of leaves and also between the duration of the third and fourth stages and the seed yield. The higher seed yield (47.0 c/ha) of the Peredovik variety was obtained when N150P136K200 was applied and of the VNIIMK 8931 variety (48.87 c/ha) when N150P170K200 was applied.