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Title:

Effect of integrated nutrient system and different planting methods on quantity and quality traits of sugar beet

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Abstract

This study investigated the growth indices, quantitative and qualitative features, and water use efficiency in sugar beet based on randomized complete blocks and split plots in different fertilizer treatments and planting methods. This research was conducted in 1396 and 1397 in the agricultural fields in Jovein. The main plot included the type of fertilizer used in four levels of chemical (100-50-75), organic (Pulled chicken manure), integrated and control (No fertilizer) and the sub-plots consisted three levels as direct cultivation, seedling and pot cultivation. According to the obtained results, total dry matter accumulation and leaf area index were similar during the first and second years of the experiment. In this case, the process of these changes was initially increasing and then it decreased after reaching its maximum value. Regarding crop growth rate (CGR), crop growth rate was low in the early stages, but by passing the time, crop growth rate increased and then decreased which was more severe in the second year than in the first year. Changes in relative growth rate (RGR) were first increasing and then decreasing, but it was different between the first and second years of the experiment. In so doing, the relative growth rate decreased over time based on a linear and non-linear function in the first and the second year of the experiment, respectively. The increasing changes were different in net absorption rate (NAR) and the time consumed in maximum net absorption rate in these two years of experiment. The maximum net absorption rate was obtained 160 days and 80 days after planting in the first and second year. After that, the rate decreased and became negative at the end of growth. The results indicated that the effect of the year was significant for most of the quantitative and qualitative features in sugar beet. In the first year of cultivation, the highest fresh weight of shoots and plant yield were allocated to plants treated with integrated fertilizer among 29.38 and 76.95 tons per hectare. In the second year of cultivation, the amount was 27.76 and 74.15 tons per hectare in the same treatment. There was no significant difference between the two years of experiment in terms of pure sugar percentage, pure sugar yield, sodium percentage, and sugar beet alkalinity coefficient. Furthermore, the effect of planting was significant on the most quantitative and qualitative features in sugar beet. Accordingly, the highest plant yield were obtained among 73.56 and 73.46 tons per hectare in pot and seedling cultivation in the first year of the experiment. Then, it 15% and 19%, decreased, respectively, compared the second year were. The results showed that it was significant in fertilizer treatments, planting treatments on water use efficiency index, plant yield, and sugar at the end of the year. Water use efficiency index of plant yield was higher than other treatments in integrated fertilizer and seedling cultivation treatments in the first and second years of the experiment. In the following, water use efficiency index in plant yield was 7.7 and 8.84 kg / m³ in integrated fertilizer treatment and seedling cultivation in the first year. In the second year, the amount was 7.62 and 7.79 kg / m³, respectively. Water use efficiency index in pure sugar yield was not affected by fertilizer treatments and planting method in the first year, but in the second year, the highest water use efficiency index in pure sugar yield was between fertilizer treatments in integrated cultivation and different planting methods. It was 1.26 and 1.35 kg / m³ in both first and second year, respectively. In general, it can be concluded that the use of compound fertilizer and seedling planting conditions have a positive effect on increasing growth indices, quantitative and qualitative features, and water use efficiency of sugar beet in the climate of Jovein region.

Keywords: net absorption rate, alkalinity coefficient, water use efficiency, seedling culture, combined fertilizer, sugar yield, potted culture.