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**Impact of Method and Time of Micronutrients
Application on Sugar Beet Yield and Quality
under Nitrogen Fertilizer Source**

By

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5. SUMMARY

Effect of method and time micronutrients application on sugar beet productivity under two nitrogen fertilizer sources.

Two experimental fields were carried out at the experimental form of Sakha agricultural research station, Agricultural research center, Egypt during two seasons 2015/16 and 2016/17. The main objective of this investigation was to study the effect of yield and quality of sugar beet as affected by method and time of micronutrients under two nitrogen sources. Two experiments were laid-out in split plot design with three replications. The main plots were assigned to nitrogen sources as follows:

1. Urea (46%N).

2. Calcium nitrate (33.5% N).

The sub-plots were occupied with 6 micronutrients treatment as follows:

b₁= 25% of recommended as basal + 75% of recommended as foliar at 60 DAS.

b₂= 25% of recommended as basal + 75% of recommended as foliar at 60 + 70 DAS.

b₃= 25% of recommended as basal + 75% of recommended as foliar at 60, 75 and 90 DAS.

b₄= 50% of recommended as basal + 50% of recommended as foliar at 60 DAS.

b₅= 50% of recommended as basal + 50% of recommended as foliar at 60, 75 DAS.

b₆= 50% of recommended as basal + 50% of recommended as foliar at 60, 75 and 90 DAS.

Summary

Sugar beet cultivar (Ras Poly) poly germ seeds was used in both seasons and planted in plot are (21 m²) in ridges (7 m) long and in wide ridge 50 cm and 20 cm between hills at the first and second week of October in both seasons respectively. Thinning was done at four true leaves stage to one plant/ hill. Phosphorous and potassium fertilizers at rate of 100 kg/fad from every one were added during land preparation. Nitrogen fertilizer was added at rate of recommended dose (90 kg/fad) at two equal doses the first after thinning and the other after one month later. Harvest was done after 210 days from sowing in both seasons.

Salient results obtained from this investigation are summarized below where the results were divided as follows:

1. Growth characters.

1.1. Root length:

Root length not affected by nitrogen sources in both seasons during all samples dates (120, 135 and 150 days after sowing).

Whereas addition of micronutrients significantly affected on this trait in both seasons. Foliar application of micronutrients as 25% as soil application and the rest 75% of the recommended dose divided at three times (60, 75 and 90 DAS) gave the longest roots compared with other treatments in both seasons without any interaction effects between two factors under study on root length in both seasons.

1.2. Root diameter (cm):

Root diameter at 120 days from sowing indicted significant effect resulted from different nitrogen sources, urea surpassed than calcium nitrate in both seasons and gave the highest values. Applying micronutrients as basal and foliar application at (twice or thrice) times gave the highest values compared another treatment. No significant

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interaction effects were observed between factors under study on root diameter in both seasons.

1.3. Leaf area index (LAI):

Fertilization of sugar beet with two nitrogen sources had significant effect on this trait at sample (120 days after sowing) in the second season only. Significant effect was found on leaf area index at 120 days from sowing in the second season and at 150 days sowing in both seasons resulted from foliar spraying of micronutrients with treatments (b₃ and b₆). This trait had no recorded significant interaction effects between two factors under study in both seasons.

2. Yield and yield attributes.

2.1. Top weight / plant and Top yield /fad:

Two traits had no significant effect from fertilization with two nitrogen sources. This was true in both seasons, but urea increase values of two characters more than another fertilizer.

Method and time of micronutrients foliar applications significantly affected on both weight and yield of top in both seasons resulted from addition treatment (b₃).

2.2. Root weight/ plant and root yield (Ton/fad):

No significant differences were observed between mean values of this two characters in both seasons due to addition of two nitrogen sources.

Foliar application of micronutrients at different method and time on sugar beet caused to significant effect on mention to traits in both seasons. The lowest values were obtained when 50% from recommended

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dose was spraying at one time (60 DAS) compared with other treatments which recorded highest ones.

3.3. Sugar yield (Ton/fad):

Fertilization of sugar beet crop with urea in both seasons increased sugar yield (Ton/fad) compared to calcium nitrate the differences did not reach to the 5% level of significant.

Micronutrients method and time of application play important role and gave significant differences among values of sugar yield and recorded the highest yields with treatment (b₃) compared with other treatments. This was true in both seasons.

3. Quality parameters.

3.1. Sucrose and loss sugar in molasses percentages:

Although the in significant of nitrogen sources on sucrose% in both seasons and on sugar loss in molasses in the first season, the highest values were obtained with urea compared to calcium nitrate. Methods and times of applications in both seasons significantly affected on extractable sugar on both season.

Significant effect was found on sugar losses in the second only on second season. Significant effects were found on sucrose and sugar losses in molasses in both season resulted from method and time of foliar spraying of micronutrients in both season resulted from method and time of foliar spraying of micronutrients in both seasons. Splitting recommended dose at soil (25 or 50%) and 75 or 50% at twice or thrice times gave the highest values compared to other treatment.

3.2. Extractable sugar and alkaline co-efficient:

Neither urea nor calcium nitrate had significant effect on two mentioned traits on both seasons.

Extractable sugar % in both season recorded the highest values and significant effects on both season two traits when micronutrients were added as 25% of recommended dose was applied as basal and the rest 75% at twice or thrice times compared to other method and time of applications.

3.3. Impurities contents (Na^+ , K^+ and α -amina N):

Nitrogen sources had significant effect on values of K^+ and α - amina N in the first season only. Urea fertilizer tended to gave the highest values in both seasons in the other impurities contents in both seasons.

Recommendations

Finally, according to obtained results, this study recommended that applying urea as nitrogen source with micronutrients as foliar spray at the times 60, 75 and 90 days after sowing gave the highest yield and quality of sugar beet under environmental condition of this study.