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INFLUENCE OF NITROGEN LEVELS, BIO– FERTILIZER AND STIMULATING GROWTH COMPOUNDS ON RICE

By

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SUMMARY

A field experiment was conducted in the two successive seasons 2014 and 2015 at the Experimental Farm of Rice Research and Training Center (RRTC), Sakha, Kafrelsheikh, Egypt; to study the effect, three nitrogen rates, three biofertilizers sources and three Stimulating growth compounds on growth, yield and its components and chemical compounds and grains quality of Giza 179 Egyptian rice cultivar. Nitrogen in form of urea [$\text{CO}(\text{NH}_2)_2$ -46%N] was used at the rate of 69,46 and 34.5 kg N fed-1 in two split dose was 2/3 as basal application incorporated in dry soil before transplanting. While the second dose was 1/3 as topdressing at 30 Days after sowing. Phosphorus fertilizer was applied in the form of single super phosphate (15.5% P_2O_5) in the permanent field and incorporated into soil during land preparation.

The biofertilizers sources namely (*Azospirillum brasilens*) bacterial inoculation and Cyanobacteria (Blue green algae) were used at the rate of 1000g fed-1 in the permanent field, the biofertilizers e.g. *Azospirillum* and Cyanobacteria mixed with enough sand to make it easy for homogenous distribution to inoculate the nursery soil 7 days after seed broadcasting and 15 days after transplanting in permanent field. The biofertilizers were produced by the general organization for Agricultural Equalization fund, Ministry of Agriculture and Land Reclamation, Egypt. Stimulating growth compound (Ascobain, Humic acid) was used as a foliar application at three times 50, 60 and 70 days after sowing (DAS). Ascobain (13% citric acid, 25% ascorbic acid plus 62% organic materials) was applied at the concentration of 1.5g liter-1. Humic acid (86% Humate potassium, 6% Oxid (Hu) was used at the rate of 0.25g liter-1.

The experimental design was Split-Split Plot with three replications. Main plots were assigned to nitrogen rate, sub-plots to biofertilizer and sub-sub-

Summary

plots to Stimulating growth compounds The previous crop was barley in the two seasons. . Plant samples were taken from each sub-sub-plot at 76, 90 and 104 days after sowing (DAS) to determine growth characters (leaf area index, crop growth rate (CGR), net assimilation rate (NAR) , dry matter accumulation m⁻¹ and plant height).

❖ The obtained results can be summarized:

1. Growth :

- Increasing nitrogen rate from 34.5 to 69kg N per feddan resulted in significant increase in leaf area index, dry matter accumulation m⁻¹ , crop growth rate (CGR) at the two periods of 76–90 and 90-104 DAS in both seasons and net assimilation rate (NAR) at the period of 90-104 DAS in the first season and the period of 76-90 DAS in the second season. The rates of 46 and 69 kg N fed-1 were statistically at par in the most mentioned traits in the two seasons.
- Biofertilizers had a significant effect on leaf area index, Dry matter accumulation of rice plant at all sampling dates, except at 76 DAS in the first season and crop growth rate(CGR) except at the period of 90-104DAS in the first season. net assimilation rate (NAR) was not significantly influenced by biofertilizers.
- Ascobien and Humic acids resulted in a significant increase in leaf area index, Dry matter accumulation than foliar spraying with water application at all sampling dates and crop growth rate (CGR) at the two growth periods in both seasons. net assimilation rate(NAR) was not significantly influenced by stimulating compounds There were no significant differences in leaf area index among foliar spraying with the two stimulating growth compounds.
 - The first and second order interactions had a significant effect on the most growth traits in both seasons.

2. Yield and yield attributes :

- Increasing nitrogen rate from 34.5 to 69 kg N per feddan resulted in significant increase in number of panicles m⁻², Panicle length (cm) , Number of filled grains per panicle, panicles weight in the two seasons. in both seasons. Increasing nitrogen rate significantly decreased the 1000-grain weight in both seasons. The rates of 46 and 69 kg N fed⁻¹ were statistically at par in most the mentioned traits in the two seasons.
- Biofertilizers had a significant effect on number of panicles m⁻² , Panicle length (cm), Number of filled grains per panicle, 1000-grain weight
- Ascobien and Humic acid resulted in a significant increase **on** number of panicles m⁻², Panicle length (cm), Number of filled grains per panicle, 1000-grain weight

3. Grain yield, straw yield and harvest index:

- Increasing nitrogen rate from 34.5 to 69 kg N per feddan resulted in significant increase in grain and straw yields. There was no significant difference between 69 and 46 kg N fed⁻¹ in grain yield in the first season only.
- Grain and straw yields were significantly affected by biofertilizer in both seasons. Application of *Azospirillum* was statistically in par with application of *Cyanobacteria* in straw yield in the two seasons
- Application of stimulating growth compounds significantly increased grain yield compared with water spray in both season. Straw yield was affected significantly by stimulating growth compounds in the second season, only.
- There were no significant difference in harvest index due to nitrogen fertilizer rate, biofertilizer and stimulating growth compounds as well as their interactions in the two seasons.

- The application of 46 kg N fed⁻¹ along with *Cyanobacteria* or *Azospirillum* and ascorbic acid or humic acid as stimulating compounds could be used successfully to achieve optimum grain yield of Giza 179 Egyptian rice cultivar.

4. Grain quality characters:

- there were no significant difference in hulling and milling percentage due to nitrogen fertilizer rate, biofertilizer and stimulating growth compounds foliar application in the two seasons.
- None of the interaction had a significant effect on hulling and milling percentage in both seasons.
- Head rice percentage was significantly affected by the application of nitrogen rates in the two seasons. Increasing nitrogen fertilizer application from 34.5 up to 69 kg N fed⁻¹ significantly increased head rice percentage in both seasons.
- Head rice percentage was affected by biofertilizers inoculation in the two seasons. Inoculation of *Cyanobacteria* or *Azospirillum* resulted in a significant increase in head rice percentage compared with uninoculation treatment in both seasons.
- there were no significant difference in head rice due to stimulating growth compounds in the two seasons.

5. Protein content in milled grain:-

- Increasing nitrogen rate from 34.5 up to 69 kg N fed⁻¹ increased significantly protein percentage in milled grain in the two seasons.
- Protein percentage in milled grain was significantly increased by bacteria inoculation of *Cyanobacteria* or *Azospirillum* than uninoculation treatment in both seasons.
- Protein percentage in milled grain was affected significantly by stimulating growth compounds in both seasons. Foliar spray with

Summary

ascobien recorded produced greater protein content in milled grain than foliar spray with water in the two seasons.

- None of the interaction had a significant effect on protein percentage in milled grain in both seasons.

It can be concluded that the application of 46 kg N fed⁻¹ along with Cyanobacteria or Azospirillum and ascobien or humic acid as stimulating compounds could be used successfully to achieve optimum grain yield of Giza 179 Egyptian rice cultivar with saving 25 % of N fertilizer (23 kg N fed⁻¹) without reduce in grain yield under these condition of this research.