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FERTILIZATION EFFICIENCY AND RESPONSE TO
TECHNIQUE OF FERTILIZER APPLICATION

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Abstract

Mechanization of fertilization practice was evaluated using the injection of ammonia solution into soil, two rates of both solid fertilizers of urea (46.5 %N) and ammonium sulfate (20.6 %N) being also evaluated for comparison.

Ammonia solution (27 %N) was injected in a clay

soil field using a designed small machine to evaluate the fertilizer efficiency at different injection pressures and tractor speeds. Such evaluation was performed through evaluation for plant behaviour to finally evaluate economically the adopted mechanization practice of fertilization as compared to classic approach of fertilization with solid fertilizers.

Results showed that application of liquid ammonia was suitable for growth and yield of wheat plants and their uptake for N, P and K. This was reflected on nutritional status of the obtained grains.

Data also revealed that injection pressure was greatly favourable up to 3 kg/cm^2 , relatively less responses being obtained towards the high injection pressure of 6 kg/cm^2 . Results also showed that tractor speed was greatly favourable in spite of relatively less response at values more than 3.5 km/h which appeared to be superior. Interaction analyses for the obtained data showed that injection pressure of 4 kg/cm^2 accompanied with tractor speed of 3.5 km/h seemed to be superior for all plant parameters under study.

As for solid fertilizers, the source had no great effect on grown plants which were, however, positively responded to applied rate whose high values were more superior during the whole studied growing season.

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KEY WORDS

Mechanical application: Injection pressure, kg/cm^2 .

Tractor speed, km/h .

Fertilizer application: Ammonia solution.

Ammonium sulfate.

Urea.

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III

List of Tables

NO	page
1. Some physical and chemical characteristics of soil under investigation.....	27
2. Soil classification.....	28
3. The fuel consumption at different studied tractor speeds.....	28
4. The time of complete discharge for tank of used machine under different injection pressures....	33
5. Amounts of nitrogen fertilizer given to grown wheat crop.....	33
6. Calculated discharge for ammonia solution under different studied injection pressures and various tractor speeds.....	35
7. Statistical analyses for interactions between injection pressure and tractor speed regarding responses of dry matter content (g/plant) for wheat plants receiving liquid fertilizer for studied growth stages.....	38
8. Statistical analyses for interactions between injection pressure and tractor speed regarding responses of height (cm) for wheat plants receiving liquid fertilizer for studied growth stages.....	39
9. Effects of source and rate of applied solid fertilizers on dry matter content (g/plant) of wheat plants for studied growth stages.....	46
10. Effects of source and rate of applied solid fertilizers on plant height (cm) for studied growth stages.....	48
11. Statistical analyses for interactions between injection pressure and tractor speed regarding response of N-uptake (mg/plant) by wheat plants receiving liquid fertilizer for studied growth stages.....	52
12. Effects of source and rate of applied solid fertilizers on N-uptake (mg/plant) by wheat plants for studied growth stages.....	55

List of Tables (cont's)

NO	page
13. Statistical analyses for interactions between injection pressure and tractor speed regarding response of P-uptake (mg/plant) by wheat plants receiving liquid fertilizer for studied growth stages.....	57
14. Effects of source and rate of applied solid fertilizers on P-uptake (mg/plant) by wheat plants for studied growth stages.....	60
15. Statistical analyses for interactions between injection pressure and tractor speed regarding response of K-uptake (mg/plant) by wheat plants receiving liquid fertilizer for studied growth stages.....	63
16. Effects of source and rate of applied solid fertilizers on K-uptake (mg/plant) by wheat plants for studied growth stages.....	66
17. Statistical analyses for interactions between injection pressure and tractor speed regarding wheat yield (ton/fed) responses of plants receiving liquid fertilizer.....	68
18. Effects of source and rate of applied solid fertilizers on wheat yield (ton/fed).....	71
19. Statistical analyses for interactions between injection pressure and tractor speed regarding response of nutritional content (%) of grains for wheat plants receiving liquid fertilizer..	76
20. Effects of source and rate of applied solid fertilizers on nutritional content (%) of grains for wheat plants.....	79
21. Theoretical economical evaluation for mechanization practice of liquid fertilization as compared with that of solid fertilization (1989).	83
22. Net profit (L.E/fed) for practical economical evaluation for mechanization practice of liquid fertilization as compared with that of classical solid fertilization (1989).....	87

List of Tables (cont's)

NO	page
23. Theoretical economical evaluation for mechanization practice of liquid fertilization as compared with that of solid fertilization (1993).	88
24. Net profit (L.E/fed) for practical economical evaluation for mechanization practice of liquid fertilization as compared with that of classical solid fertilization (1993).....	90
25. Theoretical economical evaluation for mechanization practice, 30 Hp used tractor, of liquid fertilization as compared with that of solid fertilization (1993).....	91
26. Net profit (L.E/fed) for practical economical evaluation for mechanization practice, 30 Hp used tractor, of liquid fertilization as compared with that of classical solid fertilization (1993).....	92

VI

List of Figures

NO	page
1. Diagram representing the machine used for application of liquid fertilizer.....	29
2. Diagram representing mechanisms of pressure control for the machine used in injection.....	30
3. Effect of injection pressure with variable tractor speeds on dry matter content (g/plant) of wheat plants receiving liquid fertilizer for studied growth stages.....	40
4. Effect of injection pressure with variable tractor speeds on height (cm) of wheat plants receiving liquid fertilizer for studied growth stages.....	41
5. Effect of injection pressure with variable tractor speeds on N-uptake (mg/plant) by wheat plants receiving liquid fertilizer for studied growth stages.....	53
6. Effect of injection pressure with variable tractor speeds on P-uptake (mg/plant) by wheat plants receiving liquid fertilizer for studied growth stages.....	58
7. Effect of injection pressure with variable tractor speeds on K-uptake (mg/plant) by wheat plants receiving liquid fertilizer for studied growth stages.....	64
8. Effect of injection pressure with variable tractor speeds on yield (ton/fed) of wheat plants receiving liquid fertilizer.....	69
9. Effect of injection pressure with variable tractor speeds on nutritional content (%) of grains for wheat plants receiving liquid fertilizer.....	77

INTRODUCTION

INTRODUCTION

Nowadays, it is settled that modern machine is an important practice to increase crop productivity per unit area and decreasing costs of crop production.

For developing countries, the benefits of appropriate agricultural mechanization should be realized, machines being manufactured locally for three primary reasons:

- Imported machines are usually designed for temperate zone conditions, such as those prevailing in U.S.A. or Europe, or sophisticated farmers such as those in Japan. In general, the machine is more likely to reflect the needs of local farmers and agronomic conditions.
- Foreign exchange is usually in short supply.
- Local supply of labour can be utilized.

In Egypt, the agricultural cultivated area is limited with great difficulty to be widely extended. Therefore, vertical expansion in agriculture should be of great interest. This can be performed by several means, one of which is enriching the soil by fertilizers using modern machines for application.

Soils of Egypt are known to be poor in available nitrogen due to their low content of organic matter

and presence of rather small amounts of organic manures added to them annually. Therefore, the application means of fertilizers for raising the production of most crops should be taken into consideration, several nitrogenous fertilizers being used including both liquid fertilizers, as well as, solid ones involving ammonium sulfate, calcium nitrate, ammonium nitrate and urea.

This study has been performed using a designed small machine able to inject the soil with ammonia solution as a trial to lessen the costs of broadcasting solid nitrogen fertilizers. The work included the definition of the tractor speed, as well as, pressure required for optimum injection, which should be reflected on having the best plant characteristics and yield of wheat crop.

REVIEW OF LITERATURE