

CONTENTS

INTRODUCTION	1
REVIEW OF LITERATURE	3
I-Growth and yield and its attributes:	3
II- Chemical analysis	21
MATERIALS AND METHODS	32
RESULTS AND DISCUSSION	41
<i>1-TRANSPLANTED RICE</i>	41
-Growth	41
-Yield and its attribute	44
-Chemical analysis	56
-Grain quality	63
<i>2-BROADCAST SEEDED RICE</i>	66
-Growth	66
-Yield and its attribute	69
-Chemical analysis	80
-Grain quality	87
CONCLUSION	90
SUMMARY	91
REFERENCES	96
ARABIC SUMMARY	113

SUMMARY

Four field experiments carried out at the Rice Research and Training Center (RRTC), Agric. Res. Center, Sakha, Kafr El-Sheikh, Egypt, during 2000 and 2001 seasons, to study the effect of zinc, iron and manganese application on growth, yield and its attribute, chemical components and grain quality characters of the rice cultivar Sakha104.

I- Methods of Zinc, Iron and Manganese Application to Transplanted Rice

Four field experiments were conducted to study the methods of zinc, iron and manganese application to transplanted rice after two preceding crops legume (clover) and non-legume (barely).

Each experiment involved twelve treatments which were the combination of micronutrients and its application methods as follows:

1- Micronutrients:

- 1-Zn
- 2-Zn + Fe
- 3-Zn + Mn
- 4-Zn + Fe + Mn

2- Application methods:

- 1-Nursery soil application (20kg ZnSO₄-5kg FeSO₄, MnSO₄)
- 2-Permanent field soil application (10kg ZnSO₄-5kg FeSO₄, MnSO₄)
- 3-Foliar application (2% ZnSO₄, FeSO₄, MnSO₄)

II- Methods of Zinc, Iron and Manganese Application to Broadcast Seeded Rice

Four field experiments were conducted to investigate the response of the newly rice cultivar Sakhal04 to methods of micronutrient application after two preceding crops legume (clover) and non-legume (barely).

Each experiment involved twelve treatments which were the combination of micronutrients and its application methods as follows:

1- Micronutrients:

1-Zn

2-Zn + Fe

3-Zn + Mn

4-Zn + Fe + Mn

2- Application methods:

1-Seed soaking (2% ZnSO₄, FeSO₄, MnSO₄)

2-Permanent field soil application (10kg ZnSO₄-5kg FeSO₄, MnSO₄)

3-Foliar application (2% ZnSO₄, FeSO₄, MnSO₄)

The results could be summarized as follows:

III- Methods of Zinc, Iron and Manganese Application to Transplanted Rice

1- Growth:

Rice plants fertilized with zinc alone significantly surpassed those fertilized with mixture of micronutrients by all application methods in plant height (cm) and dry matter yield (g/m²) at all sampling dates (30, 45

and 60 days from transplanting) after two preceding crops (clover and barley).

2-Yield and its attributes:

Application of zinc alone either to the nursery or to permanent field significantly increased Number of panicles/m², number of grains per panicle, filled grains percentage, panicle weight, straw yield and grain yield compared to other treatments at the two preceding crops. The inverse was true in 1000-grain weight.

3-chemical analysis of straw and grain:

Zinc concentration of straw and grain increased markedly when zinc was applied alone with any of the three method of application at the two preceding crops.

Applied zinc in combination with iron or iron plus manganese by any of the three methods of application increased iron concentration at the two preceding crops.

Application of element mixtures containing manganese increased manganese concentration. This was true when manganese was applied either to the nursery or permanent field at the two preceding crops.

4-Grain quality:

Hulling, milling and head rice percentage were not affected by zinc, iron and manganese application.

Protein content was increased by application of zinc alone while decreased by application of iron and manganese whatever the method of application.

IV- Methods of Zinc, Iron and Manganese Application to Broadcast Seeded Rice

1-Growth:

Plants received zinc alone with any application methods produced the highest plant height (cm) and dry weight (g/m^2) compared with those received mixture of elements at all sampling dates (60, 75 and 90 days after sowing) at the two preceding crops (clover and barely).

2-Yield and its attributes:

Application of zinc alone as soil application or foliar application increased Number of panicles/ m^2 , number of grains per panicle, filled grains percentage, panicle weight, straw yield and grain yield compared with other treatment at the two preceding crops. The inverse was true in 1000-grain weight.

3-chemical analysis of straw and grain:

Zinc concentration of straw and grain increased markedly when zinc was applied alone as soil or foliar application followed by seed soaking while, the concentration decreased when iron or manganese coupled with zinc whatever the preceding crop.

Applied zinc in combination with iron or iron plus manganese increased iron concentration in straw and grain compared with other treatments at the two preceding crops.

Application of manganese either with zinc or with zinc and iron increased manganese concentration especially when applied as soil application or foliar spray at the two preceding crops.

4-Grain quality:

Hulling, milling and head rice percentage were not affected by zinc, iron and manganese application.

Protein content was increased by application of zinc alone especially as soil application and foliar spray while decreased by application of iron and manganese.