



Soe Soe Thein (Autor)

Effects of Soil Fertility Management Practices on Nutrient Availability and Yield of Rice in Myanmar

Soe Soe Thein

**Effects of Soil Fertility Management Practices
on Nutrient Availability and Yield of Rice
in Myanmar**



Cuvillier Verlag Göttingen

<https://cuvillier.de/de/shop/publications/2862>

Copyright:

Cuvillier Verlag, Inhaberin Annette Jentsch-Cuvillier, Nonnenstieg 8, 37075 Göttingen,
Germany

Telefon: +49 (0)551 54724-0, E-Mail: info@cuvillier.de, Website: <https://cuvillier.de>

TABLE OF CONTENTS

LIST OF TABLES	iv	
LIST OF FIGURES	vii	
LIST OF APPENDICES	ix	
SUMMARY	xii	
ZUSAMMENFASSUNG	xiv	
1	GENERAL INTRODUCTION	1
2	LITERATURE REVIEW	5
2.1	Rice eco-and cropping systems	5
2.1.1	Upland rice	5
2.1.2	Rainfed lowland rice	5
2.1.3	Irrigated lowland rice	6
2.1.4	Deepwater rice	6
2.1.5	Rice-fish farming	6
2.2	Nutrients availability and uptake in lowland rice	7
2.2.1	Effects of flooding on soil aeration	7
2.2.2	Physico-chemical changes in submerged soil	7
2.2.2.1	Redox potential and nutrient availability	8
2.2.2.2	Soil and floodwater pH	8
2.2.2.3	Electrical conductivity	9
2.2.2.4	Nitrogen	9
2.2.2.5	Phosphorus	9
2.2.2.6	Potassium	10
2.2.2.7	Sulphur	10
2.2.2.8	Iron	10
2.2.2.9	Manganese	11
2.2.2.10	Copper, molybdenum and zinc	11
2.2.3	Organic matter dynamics and its effects on soil fertility	11
2.2.4	Nutrient interactions	11
2.2.4.1	Nitrogen by phosphorus by potassium interactions	12
2.2.4.2	Ammonium (NH_4^+) and (NO_3^-) interactions	
2.2.4.3	Nitrogen by sulphur interactions	12
2.2.5	Balanced nutrition	12
2.2.5.1	Fate of urea fertilizer in flooded rice soil and its efficient use by the rice plant	13
3	EFFECTS OF SOIL FERTILITY MANAGEMENT PRACTICES ON NUTRIENT AVAILABILITY AND YIELD OF RICE IN MYANMAR	14

3.1	Introduction	14
3.2	Materials and methods	16
3.2.1	Experimental sites and design	16
3.2.2	Measured parameters	19
3.2.2.1	Soil measurements	19
3.2.2.2	Plant measurements	19
3.2.3	Data processing and analysis	20
3.3	Results	21
3.3.1	Hmawbi	21
3.3.1.1	Effects of crop residue management on soil physical properties	21
3.3.1.2	Treatments effects on soil chemical properties in the 4 th and 6 th season	21
3.3.1.3	Treatment effects on plant growth	23
3.3.1.4	Leaf colour chart readings in rice	24
3.3.1.5	Treatment effects on total dry matter and grain yield of rice	25
3.3.1.6	Agronomic efficiency of mineral fertilizer N application with respect to total dry matter and grain yield of rice	29
3.3.1.7	Treatment effects on nutrient concentration and C:N ratio of rice straw in the 4 th and 6 th season	31
3.3.1.8	Treatment effects on nutrient concentration and C:N ratio of rice grain in the 4 th and 6 th season	32
3.3.1.9	Treatment effects on total dry matter and grain yield of greengram and on total dry matter of the fallow vegetation	34
3.3.1.10	Effects of cropping system and nitrogen management on nutrient balances	36
3.3.2	Yezin	39
3.3.2.1	Effects of crop residue management on soil physical properties	39
3.3.2.2	Treatment effects on soil chemical properties in the 4 th and 6 th season	39
3.3.2.3	Treatment effects on plant growth	41
3.3.2.4	Leaf colour chart readings in rice	42
3.3.2.5	Treatment effects on total dry matter and grain yield of rice	43
3.3.2.6	Agronomic efficiency of mineral fertilizer N application with respect to total dry matter and grain yield of rice	47
3.3.2.7	Treatment effects on nutrient concentration and C:N ratio of rice straw in the 4 th and 6 th season	50
3.3.2.8	Treatment effects on nutrient concentrations and C:N ratio of rice grain in the 4 th and 6 th season	52
3.3.2.9	Treatment effects on total dry matter and grain yield of greengram and total dry matter of the fallow vegetation	53
3.3.2.10	Effects of crop residue and nitrogen management on nutrient balances	55

3.4	Discussion	58
3.4.1	Effects of crop residue management on soil physical properties	58
3.4.2	Treatment effects on soil chemical properties in the 4 th and 6 th season	58
3.4.3	Treatment effects on plant growth	58
3.4.4	Leaf colour chart readings in rice	59
3.4.5	Cropping systems effects on total dry matter and grain yield of rice	59
3.4.6	Treatment effects on nutrient concentration and the C:N ratio of rice straw and grain	60
3.4.7	Effects of crop residue management, nitrogen application and cropping system on total dry matter and grain yield of rice	60
3.4.8	Agronomic efficiency of mineral fertilizer N application on total dry matter and grain yield of rice	60
3.4.9	Treatment effects on total dry matter and grain yield of greengram	61
3.4.10	Effects of crop residue management and nitrogen application on nutrient balances	61
3.4.11	Rates and split application of nitrogen	62
3.4.12	Important other observations of the experiment	62
3.5	Conclusions	63
4	REFERENCES	66
5	APPENDICES	76

ACKNOWLEDGEMENTS

CURRICULUM VITAE

ERKLÄRUNG