

Table of Contents

	Page
ACKNOWLEDGEMENT	i
ABSTRACT	iii
TABLE OF CONTENTS	x
LIST OF TABLES	xi
LIST OF FIGURES	xii
CHAPTER 1. INTRODUCTION	1
CHAPTER 2. LITERATURE REVIEW	3
2.1. Nitrogen nutrition of soybean	3
2.2. Vegetable soybean response to N application	8
CHAPTER 3. MATERIALS AND METHODS	10
3.1. Field survey	10
3.2. Field experimentation	11
3.3. Sampling	13
3.4. Economic analysis	16
CHAPTER 4. RESULTS	17
4.1. Marketable pod yield, potential marketable pod yield and total pod yield	17
4.2. Plant growth	19
4.3. Yield components and pod setting	23
4.4. Nitrogen fixation	27
4.5. Available soil nitrogen	40
4.6. The relationship between P(fix) and available N content in soil	42
4.7. Nodule dry weight	43
4.8. Vegetable soybean nitrogen balance	45
4.9. Economic considerations	47
CHAPTER 5. DISCUSSION	49
5.1. Vegetable soybean yield and dry matter accumulation	49
5.2. Nitrogen fixation	52
CHAPTER 6. CONCLUSIONS	57
CHAPTER 7. REFERENCES	58
APPENDIX	63
CURRICULUM VITAE	113

List of Table

	Page
Table 1. The effects of N managements on marketable and total pod yield in two varieties, 301 and AGS292.	18
Table 2. The effects of N managements on total dry weight of leaf and stem in two varieties, 301 and AGS292.	20
Table 3. The effects of N managements on biomass in two varieties, 301 and AGS292.	22
Table 4. The effects of N managements on nodes per plant, pod number per node and average 100 pod weight in two varieties, 301 and AGS292.	25
Table 5. The effects of N managements on pod number in two varieties, 301 and AGS292.	26
Table 6. The effects of N managements on relative ureide-N in two varieties, 301 and AGS292.	30
Table 7. The effects of N managements on cumulative crop N in two varieties, 301 and AGS292.	36
Table 8. The effects of N managements on the available nitrogen content in two varieties, 301 and AGS292.	41
Table 9. Nitrogen balance for vegetable soybean with six nitrogen fertilizer managements applied two varieties, 301 and AGS292.	46
Table 10. Net incremental income comparisons of different nitrogen managements in two varieties, 301 and AGS292.	48

List of Figures

	Page
Figure 1. Simplified scheme of the relationship between nitrogen fixation and nitrogen uptake from soil and fertilizer in nodulated legumes.	4
Figure 2. The layout of a 4m * 5.3m factorial experiment involving two varieties (V1: 301 and V2: AGS292) and six nitrogen rates (F1, F2, F3, F4, F5 and F6) in a randomized complete block design with four replications.	12
Figure 3. The flow chart of the process of nitrogen fixation estimation.	16
Figure 4. The effects of N managements (F1: 25 kg N/ha before planting, F2: F1 + 50 kg N/ha at the flowering stage, F3: F1 + 50 kg N/ha at the V1.5 stage, F4: F3 + 25 kg N/ha at the V4 stage, F5: F3 + 25 kg N/ha at the flowering stage and F6: F3 + 25 kg N/ha at the R4.5 stage) on the proportion of N contribution from N fixation in 301 and AGS292.	33
Figure 5. The effects of six N managements (F1: 25 kg N/ha before planting, F2: F1 + 50 kg N/ha at the flowering stage, F3: F1 + 50 kg N/ha at the V1.5 stage, F4: F3 + 25 kg N/ha at the V4 stage, F5: F3 + 25 kg N/ha at the flowering stage and F6: F3 + 25 kg N/ha at the R4.5 stage) on the total N fixed and the percentage of N fixed in 301 and AGS292.	39
Figure 6. The correlation between the available N in the soil and the proportion of N derived from N fixation in 301 and AGS292.	42
Figure 7. The effects of N managements (F1: 25 kg N/ha before planting, F2: F1 + 50 kg N/ha at the flowering stage, F3: F1 + 50 kg N/ha at the V1.5 stage, F4: F3 + 25 kg N/ha at the V4 stage, F5: F3 + 25 kg N/ha at the flowering stage and F6: F3 + 25 kg N/ha at the R4.5 stage) on the nodule dry weight in 301 and AGS292.	44