Contents

Summary i
Zusammenfassung ..... *v*
Acknowledgements ..... *ix*
Dedication ..... *xi*
Contents ..... *xiii*

Chapter 1: General Introduction 1
1.1 Background 1
1.2 Agricultural Technology Adoption in Developing Countries: The Research Gap 2
1.2.1 Adoption analysis 3
1.2.2 Socioeconomic impact analysis 6
1.3 The Relevance of Tissue Culture (TC) Banana Technology in Kenya 7
1.4 Problem Statement 11
1.5 Study Objectives and Research Questions 13
1.6 Data and Analytical Approach 14
1.6.1 Sampling and household survey 14
1.6.2 Allometric estimation of banana yield 15
1.6.3 Modeling information exposure and technology adoption 16
1.6.4 Modeling TC impacts 17
1.7 Organization of this Thesis 19

Chapter 2: Heterogenous Information Exposure and Tissue Culture Adoption in Kenya 21
2.1 Introduction 22
2.2 Background 24
2.3 Analytical Framework 26
2.4 Data and Descriptive Statistics 30
2.4.1 Survey design 30
2.4.2 Definition of dependent variables 32
2.4.3 Explanatory variables and descriptive statistics 33
2.5 Results and Discussion 35
2.5.1 Farmer perceptions of TC banana 35
2.5.2 Regression results 37
2.5.3 Predicting TC adoption rates 46
2.6 Conclusions 47

Chapter 3: Yield Effects of Tissue Culture Bananas in Kenya..... 51

3.1 Introduction 52
3.2 The Kenyan Banana Sector and Farm Survey 54
3.2.1 Banana and TC technology in Kenya 54
3.2.2 Farm survey 56
3.3 Yields and Input Use: Descriptive Analysis 59
3.4 Econometric Approach 61
3.4.1 Impact assessment and selection bias 61
3.4.2 The ESR model 63
3.4.3 Estimating treatment effects on yield 65
3.5 Estimation Results 66
3.5.1 Selection equation: determinants of adoption 66
3.5.2 Outcome equations: determinants of yield 69
3.5.3 Estimating treatment effects 71
3.6 Conclusion 73

Chapter 4: The Impact of Tissue Culture Bananas on Household Welfare . 77

4.1 Introduction 78
4.2 Background 79
4.2.1 Banana production and TC technology in Kenya 79
4.2.2 Household survey 81
4.3 Descriptive Analysis 82
4.4 Measuring Food Security 85
4.4.1 The Household Food Insecurity Access Scale (HFIAS) 85
4.4.2 Principal factor analysis 88
4.4.3 Identifying the food-insecure 90
4.5 Econometric Analysis 92
4.5.1 Model specification 92
4.5.2 Impacts on income 93
4.5.3 Impacts on food (in)security 95
4.6 Conclusion 98

Chapter 5: General Conclusions 101

5.1. Overview 101

5.2. Policy Recommendations.....106

5.3. Limitations of this Study and Suggestions for Future Research 108

References 111

Appendices..... 120

List of Tables

Table 1.1. Commercially propagated crops in Africa.....10

Table 2.1: Descriptive statistics of sampled farm households.....34

Table 2.2: Farmer perceptions about attributes of TC in comparison to traditional bananas.....36

Table 2.3: Determinants of TC awareness and knowledge exposure.....40

Table 2.4: Determinants of TC banana adoption.....43

Table 2.5: Predicted adoption rates of TC bananas 46

Table 3.1: Descriptive statistics of sampled farm households.....58

Table 3.2: Banana input use by adoption status.....61

Table 3.3: Determinants of banana yield (ESR model) 67

Table 3.4: Average TC treatment effects on banana yield.....72

Table 4.1: Descriptive statistics of TC adopters and non-adopters.....83

Table 4.2: Domains and sub-domains of the HFIAS with sample statistics.....87

Table 4.3: Summary of the PFA results (N=384) 89

Table 4.4: Estimated impacts of TC adoption on income.....94

Table 4.5: Estimated impacts of TC adoption on food insecurity.....96

List of Figures

Figure 2.1: Sources of TC knowledge among adopters and non-adopters.....37

Figure 3.1: Average banana yields for TC adopters and non-adopters 60

Figure 4.1: Mean relative food insecurity scores by adoption status.....91

Figure 4.2: Proportion of food-insecure households by adopter status 91