INTERCROPPING AND LEAF HARVEST MANAGEMENT FOR IMPROVED LEAF YIELDS IN TWO TRADITIONAL VEGETABLES: PUMPKIN (*Cucurbita maxima* L.) AND MUSTARD RAPE (*Brassica juncea* Czern.) IN ZIMBABWE.

BY

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ABSTRACT

Studies were carried out to establish ideal component combinations and relative populations, relative planting dates, leaf harvest practices and the effects of nitrogen in intercrops involving food crops (maize and groundnut) and traditional vegetables (pumpkin and mustard rape). The studies were conducted on-farm in Chinyika Resettlement Area and on-station in Harare at the University Farm (UZF) in the 2002/2003 and 2003/2004 rainy seasons.

In maize intercrops, pumpkin and mustard rape were each planted at 11.7, 23.4 and 35.3 % of the maize population. In groundnut intercropping, pumpkin was planted at 0.46, 0.92 and 1.84 %, whilst mustard rape was planted at 4.15, 8.29 and 12.44 % of the groundnut population. The vegetables were planted simultaneously and within the same row as maize or within the groundnut interrow space. A second planting of mustard rape was implemented at 10 weeks after emergence (WAE) of maize or groundnut at one site in Harare.

Generally, maize grain yield was not affected by intercrop populations at all sites in both the 2002/3 and 2003/4 seasons. In addition, it was not affected by 5 to15-day leaf harvest intervals and 1 to 6-leaf harvest intensities of the vegetable component. However, groundnut seed yield was significantly ($p \leq 0.05$) reduced by 17-45 % due to intercropping with pumpkin except in the 2003/4 season at UZF. Similarly, growth of the two traditional vegetables was significantly ($p < 0.05$) reduced under both food crops as reflected by reduced leaf size, number of leaves per plant and growth duration in both the 2002/3 and 2003/4 seasons. However, increasing pumpkin intercrop populations reduced weed density and weed biomass in both maize and groundnut, whilst mustard rape intercropping had no weed suppression effects.

Both leaf harvest intervals of five, 10 and 15 days and intensities of two, four and six leaves per growing tip had no effects on pumpkin dry leaf yields in both the 2002/3 and 2003/4 seasons, though harvesting four leaves per growing tip at 5-day intervals increased dry leaf yields by 153 % of the control (12-day leaf harvest interval). Five-day leaf harvest intervals and three-leaf intensities in mustard rape reduced leaf size, duration and plant height, but had higher dry leaf yields compared to the control. Mustard rape growth parameters and leaf yields were less responsive to 1, 2 and 3-leaf harvest intensities and 5, 10 and 15-day intervals in maize-11.7 % mustard rape intercropping than in pure mustard rape stands.

Mustard rape dry leaf yields were also increased by increasing nitrogen side dress level from 0 to 103.5 kg N ha^{-1}. Likewise, leaf nitrate and nitrogen increased significantly ($p < 0.001$) with increases in nitrogen side dress. Leaf nitrate content was higher in mustard rape leaves harvested in the morning (0.54 %) compared to those harvested at sunset (0.46 %) at 5 WAE. There was increase in level of bitterness detected in mustard rape taste and improvement of appearance after cooking with increases in nitrogen side dress level from 0 to 34.5 kg N ha^{-1}.

All intercrops for both pumpkin and mustard rape had intercropping advantages over sole cropping as revealed by land equivalent ratio (LER) values greater than unity. Higher LER values were recorded on-farm, where there were fruit yields.

Conclusions of the study are that mustard rape should ideally be intercropped with groundnut and pumpkin with maize, to minimize suppression of component crops. Secondly, leaf yields of mustard rape can be increased through simultaneous planting compared to staggered planting at 10 WAE of the main crops and higher intercrop populations (35.3 % in maize). More severe harvesting in both vegetables also increases leaf yields in pure stands. Thirdly, apart from high leaf yields, high pumpkin intercrop populations of up to 35.3 % of maize also have an advantage of effective suppression of weeds without any maize yield penalty to the farmer. Fourthly, mustard rape leaf yields can also be increased through increasing nitrogen side dress levels, with slightly perceptible effects on taste if the range is between 0 and 103.5 kg N ha^{-1}.

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DEDICATION

…… Matthew Howard Maereka "Alfred"

YOU ARE SADLY MISSED….

TABLE OF CONTENTS

TITLE PAGE……..…….. i

ABSTRACT…….……...…..…….ii

ACKNOWLEDGEMENTS……..…….…….……..iv

DEDICATION…….....v

TABLE OF CONTENTS…….……..…....…….……vi

LIST OF TABLES ……...……..……..…….…….. x

LIST OF FIGURES…….. xiii

LIST OF APPENDICES…….…….……... xv

GLOSSARY…….. xix

CHAPTER 1…….. 1

1.0 INTRODUCTION……..……..……. 1

1.1 Objectives..…….…..…….……..…… 5

1.2 Hypotheses……...……..……..…… 5

CHAPTER 2…….. 6

2.0 LITERATURE REVIEW……...…..…….…….…….…… 6

2.1 Importance of Leafy Traditional Vegetables…..... 6

2.2 Production Systems Involving Pumpkin and Mustard Rape, and Factors Limiting Research…..... 8

2.3 Performance of Pumpkin and Mustard Rape Under Intercropping Systems…...…...……...……. 9

2.4 Established Agronomic Practices for Pumpkin and Mustard Rape... 11

2.5 Responses of Pumpkin and Mustard Rape to Leaf Harvesting and Soil Fertility Management Practices……..……. 12

2.6 Priority Areas for Research in Pumpkin and Mustard Rape Cropping Systems…….. 13

CHAPTER 3……. 19

3.0 GENERAL MATERIALS AND METHODS…… 19

3.1 Location of Study Sites……..…….…...19

3.1.1 Location of Chinyika Resettlement Area (CRA)...……..….. 19

3.1.2 Location of the University Farm (UZF) (Thornpark Estate). 19

3.2 Physical Characteristics of Chinyika Resettlement Area ……..20

3.2.1 Soils…….…….……. 20

3.2.2 Rainfall and Altitude……..20

3.3 Physical Characteristics of the University Farm (UZF)…… 21

3.3.1 Topography and Soils…… 21

3.3.2 Altitude, Temperature and Rainfall……..…… 21

3.4 Crop Cultivars and Sole Crop Spacing Used in the Studies……..22

3.4.1 Maize……. 22

3.4.2 Groundnut…..…… 23

3.4.3 Pumpkin…..…… 23

3.4.4 Mustard Rape…..…… 23

3.5 Field Operations and Management of Experiments……...24

3.6 Data Collection and Analysis…… 24

CHAPTER 4……. 26

4.0 EFFECTS OF PUMPKIN AND MUSTARD RAPE POPULATIONS ON PRODCUTIVITY AND WEED SUPPRESSION IN MAIZE-PUMPKIN AND MAIZE-MUSTARD RAPE INTERCROPS ……..…….. 26

4.1 Introduction…….…….…….....26

4.2 Materials and Methods……...28

4.3 Results…….……...30

4.3.1 At the University Farm (UZF)…….…… 30

4.3.2 On-farm (CRA)…….34

4.3.3 Weed Dynamics…… 37

4.3.4 Intercrop Productivity……...…… 41

4.4 Discussion……45
4.5 Conclusions……..49
4.6 Recommendations……..……50

CHAPTER 5……. 51

5.0 EFFECTS OF PUMPKIN AND MUSTARD RAPE POPULATIONS ON PRODUCTIVITY AND WEED SUPPRESSION IN GROUNDNUT-PUMPKIN AND GROUNDNUT-MUSTARD RAPE INTERCROPS…… 51

5.1 Introduction……51
5.2 Materials and Methods……...53
5.3 Results……55
5.3.1 At the University Farm……..… 55
5.3.2 On-farm (CRA)……..…58
5.3.3 Weed Dynamics……..……..… 63
5.3.4 Intercrop Productivity..…….…. 70
5.4 Discussion……..72
5.5 Conclusions…….....77
5.6 Recommendations……..77

CHAPTER 6……. 79

6.0 EFFECTS OF VARIOUS LEAF HARVEST INTERVALS AND INTENSITIES ON PUMPKIN GROWTH AND LEAF YIELDS …… 79

6.1 Introduction……79
6.2 Materials and Methods…….. 81
6.3 Results……83
6.4 Discussion……..89
6.5 Conclusions…….....93
6.6 Recommendations……..……94

CHAPTER 7…….. 95

7.0 EFFECTS OF LEAF HARVEST INTERVALS AND INTENSITIES ON GROWTH AND LEAF YIELDS OF MUSTARD RAPE ……..……95

7.1 Introduction……95

7.2 Materials and Methods……...97

7.3 Results……99

7.4 Discussion…….....108

7.5 Conclusions……112

7.6 Recommendations…….....113

CHAPTER 8…….. 114

8.0EFFECTS OF NITROGEN FERTILIZATION AND TIME OF HARVESTING ON LEAF NITRATE CONTENT AND TASTE IN MUSTARD RAPE…… 114

8.1 Introduction……114

8.2 Materials and Methods……...116

8.3 Results……119

8.4 Discussion……..127

8.5 Conclusions…….....131

8.6 Recommendations…….……..……...131

CHAPTER 9…….. 133

9.0 GENERAL DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS……133

9.1 General Discussion...…….....……... 133

9.2 Conclusions and Recommendations……. 140

REFERENCES…….……142

APPENDICES……..…… 155

LIST OF TABLES

Table 4.1: Effects of cropping system on maize grain yield and mustard rape leaf size in the second planting at UZF in 2002/3 and 2003/4……..…….31

Table 4.2: Effects of cropping system on various characteristics of mustard rape in the second planting at UZF in the 2002/3 and 2003/4 seasons……..32

Table 4.3 Effects of cropping system on pumpkin characteristics at the University Farm in the 2002/3 and 2003/4 seasons..……..…….34

Table 4.4 Effects of cropping system on maize grain yield and, duration and branching of pumpkin over the on-farm environments…….……..... 33

Table 4.5: Effects of intercrop population on pumpkin leaf and fruit yields on-farm…….……..36

Table 4.6: Effects of cropping system on weed density and weed biomass at Chinyudze and Gowakowa in 2003/4……...……...…….39

Table 4.7: Effects of cropping system on weed density and weed biomass at Bingaguru in 2003/4 and Chinyudze in 2002/3…….…… 40

Table 4.8: Effects of cropping system on weed density and weed biomass in maize-based cropping systems at UZF in 2002/3…….……42

Table 4.9: Effects of cropping system on weed density and weed biomass in maize-based cropping systems at UZF in 2003/4……..43

Table 4.10: Effects of vegetable intercrop population on the productivity of maize-based intercrops at UZF in the 2002/3 and 2003/4 seasons……44

Table 4.11: Effects of pumpkin intercrop population on the productivity of maize-based intercrops at on-farm…….……45

Table 5.1: Effects of cropping system on 1000 seed weight and number of pods per plant in groundnut at UZF in the 2002/3 and 2003/4 seasons...…….. 55

Table 5.2: Effects of season and cropping system on pumpkin duration, leaf size and dry leaf yield at UZF over the 2002/3 and 2003/4 seasons…..…….. 57

Table 5.3: Effects of season and cropping system on length of vegetative period and dry leaf yield in the second planting of mustard rape at UZF over the 2002/3 and 2003/4 seasons……..…….. 58

Table 5.4: Effects of cropping system on 1000 seed weight and number of pods per plant in groundnut over the on-farm sites in the 2002/3 season…….. 59
Table 5.5: Effects of cropping system on groundnut seed yield on-farm in the 2002/3 and 2003/4 seasons……..…….. 61
Table 5.6: Effects of intercrop population on pumpkin leaf size and, leaf and fruit yields in the 2002/3 and 2003/4 seasons on-farm…….……..... 62
Table 5.7: Effects of cropping system on weed density and weed biomass in groundnut-based cropping systems at UZF in 2002/3……... 64
Table 5.8: Effects of cropping system on weed density and weed biomass in groundnut-based cropping systems at UZF in 2003/4……... 65
Table 5.9: Effects of cropping system on weed density and weed biomass at Chinyudze and Bingaguru in 2002/3……. 66
Table 5.10: Effects of cropping system on weed density and weed biomass at Gowakowa 2002/3 and Bingaguru in 2003/4…… 68
Table 5.11: Effects of cropping system on weed density and weed biomass at Chinyudze and Gowakowa in 2003/4…… 69
Table 5.12: Effects of intercrop population on the productivity of groundnut-mustard rape intercrops at the University Farm in the 2002/3 and 2003/4 seasons…… 70
Table 5.13: Effects of intercrop population on the productivity of pumpkin intercrops at the University Farm in the 2002/3 and 2003/4 seasons, and on-farm in the 2002/3 and 2003/4 seasons…… 72
Table 6.1: Effects of leaf harvests and seasons on cob length and grain yield in maize, and pumpkin leaf size over the 2002/3 and 2003/4 seasons……. 84
Table 6.2: Effects of harvest interval on pumpkin vine length and growth duration in the 2002/3 season…….....……..85
Table 6.3: Effects of harvest intensity on branching and vine length of pumpkin in the 2002/3 season…….....…….. 85
Table 6.4: Effects of cropping system and leaf harvests on leaf yield and branching in pumpkin in the 2002/3 and 2003/4 seasons ……...……..86
Table 6.5: Effects of leaf harvest interval and intensity on the productivity

of maize-pumpkin intercrops in the 2002/3 and 2003/4 seasons……..……..88
Table 7.1: The response of maize grain yield and 1000 grain weight to leaf harvests in the mustard rape component in Experiments 1 and 2……..101
Table 7.2: Effects of leaf harvest intensity on length of vegetative phase and dry leaf yield of mustard rape in Experiment 1 (second planting) and Experiment 2 (both planting times) over the 2002/3 and 2003/4 seasons…. 100
Table 7.3: Effects of leaf harvests in the second planting of mustard rape on the productivity of maize-mustard rape intercrops in Experiment 1in the 2002/3 and 2003/4 seasons…… 107
Table 7.4: Effects of planting time and leaf harvests on the productivity of maize-mustard rape intercrops in Experiments 1 and 2 in 2003/4…….108
Table 8.1: Effects of leaf harvesting time on mustard rape leaf size and dry leaf yield in Seasons 1 and 2……..…….……..... 119
Table 8.2: Effects of harvesting time and nitrogen side dress rate on mustard rape leaf nutrient content in Seasons 1 and 2 ……..……..121
Table 8.3: Effects of leaf harvesting time on taste attributes of mustard rape in Seasons 1 and 2…….…… 124
Table 8.4: Taste panelists' perception of the effects of nitrogen side dress rate on mustard rape taste attributes in Seasons 1 and 2……126

LIST OF FIGURES

Figure 3.1: Rainfall amounts received at Chinyudze in the 2002/3 and 2003/4 seasons and Gowakowa in 2003/4..…….…..21
Figure 3.2: Rainfall amounts received at the University Farm (UZF) during the study period: 2002/3 and 2003/4……...…….. 22
Figure 4.1: Effects of cropping system and planting date on mustard rape characteristics at UZF in 2003/4……..…….…….33
Figure 4.2: Effects of cropping system and season on pumpkin characteristics at UZF …….……...…..…..35
Figure 4.3: Effects of on-farm environment and cropping system on pumpkin characteristics ……..…..…….……..…….38
Figure 5.1: Effects of season and cropping system on groundnut seed yield and pumpkin vine length at the University Farm…..……. 56
Figure 5.2: Effects of planting time and cropping system on mustard rape leaf size and dry leaf yield at UZF in 2003/4…….…….. 59
Figure 5.3: Effects of the interaction between site and cropping system on 1000 seed weight and number of pods per plant in groundnut on-farm in the 2003/4 season ……...…….……..60
Figure 6.1: Effects of cropping system and leaf harvest intensity on pumpkin growth duration and vine length in 2002/3…….……... 87
Figure 6.2: Effects of the interaction between cropping system and leaf harvest interval on various pumpkin characteristics……..…….……... 89
Figure 7.1: Effects of the interaction between cropping system and leaf harvest interval on various attributes of mustard rape in the second planting in Experiment 1….……...102
Figure 7.2: Effects of the interaction between cropping system and harvest intensity in the second planting of mustard in Experiment 1 on leaf size in 2002/3 and dry leaf yield in 2003/4…….…….. 103
Figure 7.3: Effects of the interaction between time of planting and harvest intensity on mustard rape leaf size in 2003/4: in Experiment 1 and

in Experiment 2 ……..……..…….. 104
Figure 7.4: Effects of the interaction between time of planting and leaf harvest interval on mustard characteristics in Experiment 2 in 2003/4…….…..... 105
Figure 7.5: Effects of the interaction between cropping system and time of planting on mustard rape leaf yield and leaf size in Experiment 2 in 2003/4……...…. 106
Figure 8.1: Effects of nitrogen side dress rate on mustard rape leaf size and dry leaf yield in Seasons 1 and 2……..…….…..... 120
Figure 8.2: Effects of seasons, nitrogen side dress rate and leaf harvesting time on mustard rape plant characteristics…….……123
Figure 8.3: Effects of season and nitrogen side dress rate on SPAD values during mustard rape growth……..…… 124

LIST OF APPENDICES

Appendix 1: Characteristics of the Natural Regions of Zimbabwe……....……. 155
Appendix 2: Characteristics of soils in the study areas……...…….. 155
Appendix 3: Taste Panels Questionnaire…….…... 156
Appendix 4: Analysis of Variance (ANOVA) for the effects of pumpkin and mustard rape intercropping and sole cropping in maize-based cropping systems…….....……157
Appendix 4.1: ANOVA for the effects of cropping system on maize characteristics in 2002/3 and 2003/4 at UZF.....…… 157
Appendix 4.2: ANOVA for the effects of cropping system on mustard rape characteristics in maize-based cropping systems at UZF in 2002/3 and 2003/4.....…… 157
Appendix 4.3: ANOVA for the effects cropping system on pumpkin characteristics in maize-based cropping systems at UZF in 2002/3 and 2003/4..... …… 160
Appendix 4.4: ANOVA for the effects cropping system on maize characteristics on-farm.....…… 162
Appendix 4.5: ANOVA for the effects of cropping system on pumpkin characteristics in maize-based cropping systems on-farm.....…… 162
Appendix 4.6: ANOVA for the effects of cropping system on weed density and weed biomass in maize-based cropping systems at UZF and on-farm..... … 165
Appendix 5: ANOVA for the effects of pumpkin and mustard rape intercropping and sole cropping in groundnut-based cropping systems..... 174
Appendix 5.1: ANOVA for the effects of cropping system on groundnut characteristics in 2002/3 and 2003/4 at UZF……..... 174
Appendix 5.2: ANOVA for the effects of cropping system on pumpkin characteristics in groundnut-based cropping systems in 2002/3 and 2003/4 at UZF…….……..... 175
Appendix 5.3: ANOVA for the effects of cropping system on mustard rape characteristics in groundnut-based cropping systems in 2002/3 and 2003/4 at UZF…….……..... 176

Appendix 5.4: ANOVA for the effects of cropping system on groundnut characteristics on-farm……..…….…….....178
Appendix 5.5: ANOVA for the effects of cropping system on pumpkin characteristics in groundnut-based cropping systems on-farm…….....180
Appendix 5.6: ANOVA for the effects of cropping system on weed density and weed biomass in groundnut-based cropping systems at UZF and on-farm... 184
Appendix 6: ANOVA for the effects of leaf harvest interval and leaf harvest intensity in pumpkin on maize and pumpkin characteristics at UZF in 2002/3 and 2003/4……..... 196
Appendix 6.1: ANOVA for the effects of leaf harvest interval and leaf harvest intensity in pumpkin on component maize characteristics……...……..... 196
Appendix 6.2: ANOVA for the effects of leaf harvest interval and leaf harvest intensity on pumpkin characteristics in the 2002/3 and 2003/4 seasons at UZF…… 197
Appendix 7: ANOVA for the effects of leaf harvest interval and leaf harvest intensity in pumpkin on maize and mustard rape characteristics at UZF in 2002/3 and 2003/4……..... 201
Appendix 7.1: ANOVA for the effects of leaf harvest interval and leaf harvest intensity in mustard rape on component maize characteristics…...……..... 201
Appendix 7.2: ANOVA for the effects of leaf harvest interval and leaf harvest intensity on mustard rape characteristics in the 2002/3 and 2003/4 seasons at UZF…… 203
Appendix 8: ANOVA for the effects of nitrogen side dress rate and time of harvesting on mustard rape characteristics at the University campus in Season 1 and Season 2 in 2004…..…… 207
Appendix 8.1: ANOVA for the effects of nitrogen side dress rate on average harvested leaf size in mustard rape in Season 1…….. …… 207
Appendix 8.2: ANOVA for the effects of nitrogen side dress rate on mustard rape dry leaf yield in Season 1……...….. ……207
Appendix 8.3: ANOVA for the effects of nitrogen side dress rate on average harvested leaf size in mustard rape in Season 2…….. …… 207

Appendix 8.4: ANOVA for the effects of nitrogen side dress rate on mustard rape dry leaf yield in Season 2……...….. ……207
Appendix 8.5: ANOVA for the effects of nitrogen side dress rate on percentage leaf nitrogen content at five WAE of mustard rape in Season 1…..…… 208
Appendix 8.6: ANOVA for the effects of nitrogen side dress rate on percentage leaf vitamin C content at seven WAE of mustard rape in Season 1…… 208
Appendix 8.7: ANOVA for the effects of nitrogen side dress rate on percentage leaf vitamin C content at five WAE of mustard rape in Season 2...…… 208
Appendix 8.8: ANOVA for the effects of nitrogen side dress rate on percentage leaf nitrogen content at five WAE of mustard rape in Season 2……..… 208
Appendix 8.9: ANOVA for the effects of nitrogen side dress rate on percentage leaf nitrate content at five WAE of mustard rape in Season 2……..… 209
Appendix 8.10: ANOVA for the effects of nitrogen side dress rate on percentage leaf nitrogen content at seven WAE of mustard rape over seasons 1 and 2…….. 209
Appendix 8.11: Friedman test for non-parametric mustard rape vitamin C content data at five WAE of mustard rape in Season 1 by nitrogen level blocked by block..……..……..209
Appendix 8.12: Friedman test for non-parametric mustard rape plant height in Season 1 by nitrogen level blocked by block..…….. 210
Appendix 8.13: Friedman test for non-parametric mustard rape plant height in Season 2 by nitrogen level blocked by block..…….. 210
Appendix 8.14: ANOVA for the effects of nitrogen side dress rate on SPAD values at three WAE of mustard rape over seasons 1 and 2…….. 210
Appendix 8.15: ANOVA for the effects of nitrogen side dress rate on SPAD values at four WAE of mustard rape over seasons 1 and 2…..…….. 211
Appendix 8.16: ANOVA for the effects of nitrogen side dress rate on SPAD values at five WAE of mustard rape over seasons 1 and 2…...……..211
Appendix 8.17: ANOVA for the effects of nitrogen side dress rate on SPAD values at six WAE of mustard rape over seasons 1 and 2…….. 211

Appendix 8.18: ANOVA for the effects of nitrogen side dress rate on
SPAD values at seven WAE of mustard rape over seasons 1 and 2……..212
Appendix 8.19: ANOVA for the effects of nitrogen side dress rate on
SPAD values at nine WAE of mustard rape over seasons 1 and 2…..…….. 212

GLOSSARY

%	percent
ANOVA	Analysis of Variance
AREX	Agricultural Research and Extension Department
Ca	calcium
$CaCl_2$	calcium chloride
cm	centimetre
CRA	Chinyika Resettlement Area
EDTA	ethylene diamine tetraacetic acid
FAO	Food and Agriculture Organisation
Fe	iron
g	gram
ha	hectare
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
K_2O	potash
kg	kilogram
mg	milligram
ml	millilitre
mm	millimetre
N	nitrogen
Na	sodium
NO^-_3	nitrate
NR	Natural Region
P_2O_5	phosphate
ppm	parts per million
spp	species
SPSS	Statistical Package for the Social Sciences
t	tonnes
UMP	Uzumba Maramba Pfungwe
USDA	United States Department of Agriculture
UZF	University Farm
WAE	weeks after emergence
WHO	World Health Organization