

TABLE OF CONTENTS

CHAPTER #	TITLE	PAGE #
	ACKNOWLEDGEMENT	i
	TABLE OF CONTENTS	iv
	LIST OF TABLES	viii
	LIST OF FIGURES	xi
	LIST OF APPENDIX	xiii
	ABSTRACT	xv
I	INTRODUCTION	1
II	REVIEW OF LITERATURE	5
2.1	EFFECT OF POTASSIUM MANAGEMENT ON SOIL FERTILITY STATUS	5
2.1.1	Types and assessment of K in soil	6
2.2	EFFECT OF K MANAGEMENT ON PHYSIOMORPHOLOGICAL CHARACTERS OF POTATO	7
2.2.1	Physiological functions	7
2.2.2	Plant Phenology	8
2.3	EFFECTS OF POTASSIUM APPLICATION	9
2.3.1	Effect on potato yield	10
2.3.2	Physiological disorders	16
2.3.3	Incidence of diseases	17
2.3.4	Storage losses and shelf life	18
2.3.5	Nitrogen use efficiency	18
2.4	TUBER QUALITY	18
2.5	TUBER COMPOSITION	19
2.5.1	Dry matter contents %age	19
2.5.2	Starch Content	21
2.5.3	Sugar Content	22
2.5.4	Protein Content	23
2.5.5	Ascorbic Acid	23
2.6	POTASSIUM SOURCES	24
2.7	METHODS OF POTASSIUM APPLICATION	25
2.8	DEFICIENCY SYMPTOMS OF K ON POTATO CROP	26
2.9	POST HARVEST	27
2.9.1	Weight loss	28
2.9.2	Rotting and Shrinkage %age	28
2.9.3	Sporting percentage	28
2.9.4	Types of storage	29
2.9.5	Changes in tuber composition during storage	29
III	MATERIALS AND METHODS	31
3.1	SITE	31
3.2	PHYSIO-CHEMICAL SOIL ANALYSIS	31
3.2.1	Chemical analysis	31
3.3	STUDIES FOR POTASSIUM MANAGEMENT	32
3.3.1	Materials and methods	32
3.3.2	Layout	33
3.3.3	Crop husbandry	33
3.3.4	Experiment No.1	33

3.3.4.1	Treatments	33
3.3.5	Experiment No.2	34
3.3.5.1	Treatments	34
3.3.6	Experiment No.3	34
3.3.6.1	Treatments	34
3.3.7	Parameters studied	35
3.3.7.1	Total emergence percentage	35
3.3.7.2	No. of aerial stems plant ⁻¹	35
3.3.7.3	No. of leaves plant ⁻¹	35
3.3.7.4	Plant height (cm)	35
3.3.7.5	No. of tubers plant ⁻¹	35
3.3.7.6	Tuber weight plant ⁻¹	36
3.3.7.7	Yield ha ⁻¹ (tons)	36
3.3.7.8-9	Specific gravity and Tuber dry matter percentage	36
3.3.7.10	TSS (° Brix)	36
3.3.7.11	Tuber dry weight plant ⁻¹ (g)	36
3.3.8	Experiment No.4	37
3.3.8.1	Treatments	37
3.3.8.2	Parameters studied	37
3.3.8.2.1	No. of leaves	37
3.3.8.2.2	Leaf area index	37
3.3.8.2.3	Leaf area duration	38
3.3.8.2.4	Crop growth rate	38
3.3.8.2.5	Relative growth rate	38
3.3.8.2.6	Net assimilation rate	38
3.3.8.2.7	Stem diameter	39
3.3.8.2.8	Stem length	39
3.3.8.2.9	Chlorophyll contents	39
3.3.8.2.10	Gas exchange characteristics	39
3.3.8.2.11	Water use efficiency	39
3.3.8.3	Storage behavior	39
3.3.8.3.1	Materials and methods	39
3.3.8.3.2	Parameters studied	40
3.3.8.3.2.1	Weight loss %age	40
3.3.8.3.2.2	Sprouting percentage	40
3.3.8.3.2.3	Rotting percentage	40
3.3.8.3.2.4	Physiological disorders %age	40
3.3.8.3.2.5	Starch	40
3.3.8.3.2.6	Proteins	41
3.3.8.3.2.7	Reducing sugars	41
3.3.8.3.2.8	Vitamin-C	42
3.3.9	Statistical approach	42
IV	RESULTS AND DISCUSSION	43
4.1	EXPERIMENT NO. 1	43
4.1.1	Total Emergence Percentage	43
4.1.2	Number of Aerial Stems Plant ⁻¹	44
4.1.3	Number of Leaves Plant ⁻¹	45
4.1.4	Plant height (cm)	47
4.1.5	Number of tubers plant ⁻¹	48
4.1.6	Tuber weight plant ⁻¹ (grams)	51
4.1.7	Yield (Tons ha ⁻¹)	52

4.1.8	Specific gravity	53
4.1.9	Tuber dry matter percentage	55
4.1.10	Total soluble solids ($^{\circ}$ Brix)	56
4.1.11	Tuber dry weight plant ⁻¹ (g)	56
4.2	EXPERIMENT NO. 2	60
4.2.1	Total Emergence percentage	60
4.2.2	No. of aerial stems plant ⁻¹	61
4.2.3	No. of leaves plant ⁻¹	62
4.2.4	Plant height (cm)	64
4.2.5	No. of tubers plant ⁻¹	65
4.2.6	Tuber weight plant ⁻¹	66
4.2.7	Yield (Tons ha ⁻¹)	68
4.2.8	Specific gravity	69
4.2.9	Tuber dry matter percentage	70
4.2.10	Tuber total soluble solids ($^{\circ}$ Brix)	72
4.2.11	Tuber dry weight plant ⁻¹ (g)	73
4.3	EXPERIMENT NO 3	76
4.3.1	Total Emergence Percentage	76
4.3.2	No. of aerial stems plant ⁻¹	77
4.3.3	No. of leaves plant ⁻¹	78
4.3.4	Plant height (cm)	80
4.3.5	No. of tubers plant ⁻¹	81
4.3.6	Tuber weight plant ⁻¹	82
4.3.7	Yield (Tons ha ⁻¹)	84
4.3.8	Specific gravity	85
4.3.9	Tuber dry matter %age	86
4.3.10	Tuber total soluble solids ($^{\circ}$ Brix)	88
4.3.11	Tubers dry weight plant ⁻¹	89
4.4	EXPERIMENT NO.4	92
4.4.1	No. of leaves	92
4.4.2	Leaf area index	94
4.4.3	Leaf area duration	95
4.4.4	Crop growth rate	97
4.4.5	Relative growth rate	99
4.4.6	Net assimilation rate	100
4.4.7	Stem length (cm)	101
4.4.8	Stem diameter (cm)	104
4.4.9	Chlorophyll contents	105
4.4.10	Net photosynthesis rate	107
4.4.11	Intra-cellular CO ₂ concentration	110
4.4.12	Transpiration rate	112
4.4.13	Stomatal conductance	115
4.4.14	Water use efficiency	117
4.4.15	Storage behavior	119
4.4.16	Weight Loss %age	120
4.4.17	Sprouting %age	123
4.4.18	Rotting %age	126
4.4.19	Physiological disorders %age	127
4.4.20	Starch contents %age	129
4.4.21	Protein contents %age	132
4.4.22	Reducing sugars	134

4.4.23	Vitamin C	137
V	SUMMARY	141
	REFERENCES	148
	APPENDICES	167