

C O N T E N T S

	Page
1. INTRODUCTION	1
2. REVIEW OF LITERATURE	3
2.1. Behaviour of Fe in soil and plant	3
2.1.1. Solubility of Fe in soils	3
2.1.2. Availability of soil Fe to growing plants	5
2.1.3. Mechanisms of iron absorption and trans- location	6
2.2. Function of Fe in plant	10
2.3. Iron chlorosis	13
2.3.1. Characterization and diagnosis of Fe chlorosis	14
2.3.2. Causative factors of iron chlorosis	17
2.3.2.1. Iron chlorosis in relation to calcium carbonate content in soil	19
2.3.2.2. Iron chlorosis in relation to bicarbonate ions	20
2.3.2.3. Iron chlorosis in relation to soil pH:	22
2.3.2.4. Iron chlorosis in relation to soil moisture	23
2.3.2.5. Iron chlorosis in relation to inter- action of Fe and P	24
2.3.2.6. Iron chlorosis in relation to interaction between Fe and heavy metals	26
2.3.2.6.1. Zinc-iron interaction	27
2.3.2.6.2. Manganese-iron interaction	28
2.3.2.6.3. Copper-iron interaction	29
2.3.2.7. Iron chlorosis in relation to unbalanced cation contents of soil	30
2.3.3. Control of Fe chlorosis	32
2.3.3.1. Control of Fe chlorosis with soil treatments	32
2.3.3.2. Control of Fe chlorosis with foliar sprays	35

	Page
3. MATERIAL AND METHODS:	
3.1. Preparation of sand culture	38
3.2. Experimental work	38
3.2.1. Experiment I	38
3.2.2. Experiment II	39
3.2.3. Experiment III	41
3.3. Analytical procedures	42
3.3.1. Sand culture analysis	42
3.3.1.1. Extraction of leached iron and iron fractions	42
3.3.1.2. Determination of leached iron and extracted iron fraction	43
3.3.2. Plant analysis.	
3.3.2.1. Preparation of plant samples for deter- mination of iron and other nutrients ...	43
3.3.2.2. Plant nutrients determination	43
4. RESULTS AND DISCUSSION:	
4.1. Experiment 1. Iron chlorosis as affected by Fe applications (Source and rate)	45
4.1.1. Dry matter yield of sorghum as affected by Fe application	45
4.1.2. Nutrient elements in sorghum as affected by iron application	50
4.1.2.1. Iron concentration and uptake by sorghum	50
4.1.2.2. Phosphorus concentration and uptake by sorghum	60
4.1.2.3. Calcium concentration and uptake by sorghum	66
4.1.2.4. Magnesium concentration and uptake by sorghum	71
4.1.2.5. Manganese concentration and uptake by sorghum	71

	Page
4.1.2.6. Relative occurrence of P, Fe, Mn and Ca in sorghum plants as affected by Fe application.....	78
4.1.3. Iron that remained or lost during and at the end of experiment	83
4.2. Experiment II. Iron chlorosis as affected by CaCO_3 and Fe applications	88
4.2.1. Dry matter yield of sorghum as affected by CaCO_3 and Fe applications	88
4.2.2. Nutrient elements in sorghum as affected by CaCO_3 and Fe applications	91
4.2.2.1. Iron concentration and uptake by sorghum	91
4.2.2.2. Phosphorus concentration and uptake by sorghum	95
4.2.2.3. Calcium concentration and uptake by sorghum	99
4.2.2.4. Magnesium concentration and uptake by sorghum	103
4.2.2.5. Manganese concentration and uptake by sorghum	103
4.3. Experiment III. Iron chlorosis as affected by phosphate applications	110
4.3.1. Phosphorus concentration and uptake by sorghum	110
4.3.2. Iron concentration and uptake by sorghum ..	117
4.3.3. Calcium concentration and uptake by sorghum ..	119
4.3.4. Magnesium concentration and uptake by sorghum	120
4.3.5. Ratio of phosphorus to iron (P/Fe).....	120
5. SUMMARY	123
6. REFERENCES	129
7. ARABIC SUMMARY	