CONTENTS

LIST OF TABLES iii

LIST OF FIGURES v

1. INTRODUCTION 1
2. REVIEW OF LITERATURE 6
2.1 Nitrification in soils 6
2.2 Nitrification in rhizosphere soils 10
2.3 Nitrifying bacteria 12
  2.3.1 Autotrophic nitrification 12
  2.3.2 Heterotrophic nitrification 14
2.4 Isolation and enumeration methods 17
  2.4.1 Most Probable Number (MPN) technique 17
2.5 Inhibitors of nitrification 21
  2.5.1 Neem cake 23
3. MATERIALS AND METHODS 26
3.1 Soil used 26
3.2 Soil characteristics 26
3.3 Pot experiments 26
3.4 Neem oil cake 27
3.5 Soil sampling and dilution 27
  3.5.1 Rhizosphere soil samples 27
  3.5.2 Non-rhizosphere soil 28
  3.5.3 Enumeration of bacterial populations by MPN method 28
  3.5.3.1 MPN for Nitrosonomas 28
  3.5.3.2 MPN for Nitrobacter 30
  3.5.3.3 Spot test 31
3.6 Statistical analyses 31
4. RESULTS AND DISCUSSION

4.1 Populations of autotrophic nitrifying bacteria

4.1.1 Populations of autotrophic ammonia-oxidising bacteria in the soil samples

4.2 Populations of autotrophic nitrifying bacteria in the rhizosphere soil samples

4.2.1 Population of *Nitrosomonas*

4.2.1.1 Effect of season

4.2.1.2 Effect of neem cake

4.3 Population of autotrophic nitrifying bacteria in the soil samples

4.3.1 Population of nitrite-oxidising bacteria in the soil samples

4.4 Populations of autotrophic nitrite-oxidising bacteria in the rhizosphere soil samples

4.4.1 Population of *Nitrobacter*

4.4.1.1 Effect of season

4.4.1.2 Effect of neem cake

5. SUMMARY

6. REFERENCES