# CONTENTS

<table>
<thead>
<tr>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
</tr>
<tr>
<td>II</td>
</tr>
<tr>
<td>III</td>
</tr>
<tr>
<td>IV</td>
</tr>
</tbody>
</table>

## 1. GENERAL INTRODUCTION AND REVIEW OF LITERATURE

1.1. Madagascar  
1.2. Thailand  
1.3. Bangladesh  
1.4. Sri Lanka  
1.5. India  
1.5.1. Traditional cultivation in NE India  
1.5.1.1. Wet rice cultivation by Apatani of Arunachal Pradesh  
1.5.1.2. Jhum cultivation in Khasi hills of NE India  
1.5.1.3. Cultivation by Mao tribes  
1.5.2. Uttar Pradesh  
1.5.3. West Bengal  
1.6. Objectives

## 2. MATERIALS AND METHODS

2.1. Wayanad district  
2.2. Tribes of Wayanad  
2.2.1. Kuruchiyar  
2.2.2. Mullakuruman  
2.2.3. Thachanadan Moopan  
2.2.4. Wayanadan Chetti  
2.3. Methodology

## 3. STATUS OF TRIBAL AND SMALL FARMERS OF WAYANAD DISTRICT

3.1. Status of tribal and small farmers of Wayanad district  
3.1.1. Ownership of land  
3.1.2. Land use pattern  
3.1.3. Cultivation of other crops  
3.1.4. Labour management  
3.1.5. Introduction of plantation crops  
3.1.6. Decline in paddy cultivation

## 4. TRADITIONAL PADDY CULTIVATION PRACTICES

4.1. Introduction and review of literature  
4.1.1. Indigenous varieties  
4.1.2. Cultivation practices
4.1.2.1. Paddy cultivation seasons - India 48
4.1.2.2. Salient features of major rice producing countries 51
4.1.3. Direct seeding of paddy 54
4.1.4. Deities and rituals connected with agriculture 57
4.1.5. Seed treatment and storage 60
4.1.5.1. Seed Selection 60
4.1.5.2. Seed storage 60
4.1.5.3. Seed treatment 62
4.1.6. Pest and disease management 63
4.1.7. Physical characters of paddy varieties 69
4.1.8. Cooking characters of paddy varieties 73
4.1.9. Uses of rice 76
4.2. Materials and methods 80
4.2.1. Indigenous and other paddy varieties 80
4.2.2. Cultivation practices 80
4.2.3. Physical characters 81
4.2.4. Cooking characters 82
4.3. Results and discussion 84
4.3.1. Indigenous and other paddy varieties 84
4.3.2. Cultivation practices 96
4.3.2.1. Direct seeding of paddy (Vazhicha Krishi) 101
4.3.2.2. Seed treatment and storage 107
4.3.2.3. Harvesting and traditional threshing 112
4.3.2.4. Deities and rituals connected with agriculture 115
4.3.3. Pest and disease management methods 128
4.3.3.1. Field Management methods 128
4.3.3.2. Mechanical methods 129
4.3.3.3. Uses of plants 132
4.3.3.4. Beliefs 134
4.3.4. Physical characters of traditional paddy varieties 135
4.3.5. Cooking characters of traditional paddy varieties 143
4.3.6. Uses of traditional rice 148

5. ARBUSCULAR MYCORRHIZAL ASSOCIATION AND SEASONAL VARIATION IN BLACK PEPPER

5.1. Introduction 153
5.2. Review of literature 155
5.2.1. General 155
5.2.2. Arbuscular mycorrhizal (AM) fungi 155
5.2.2.1. Ecology of AM fungi 156
5.2.2.2. Status and effect of AM fungi in spice crops (Cardamom and Pepper) 166
5.3. Materials and methods 169
5.3.1. Sample sites and sample collection 169
5.3.2. Estimation of AMF colonization 170
5.3.2.1. Processing of root samples 170
5.3.2.2. Estimation of AM fungal colonization from root samples 170
5.3.2.3. Estimation of AM spores from the rhizosphere soil 171
5.3.2.4. Identification of AM spores from the rhizosphere soil 173
5.4. **Results and discussion**

5.4.1. Climatic data and soil physico-chemical properties of the study locations

5.4.1.1. Climatic data of the study locations

5.4.1.2. Physico-chemical properties of the rhizosphere soil

5.4.2. Status of AM fungi in association with black pepper

5.4.2.1. Mean percent root colonization of AM fungi and soil spore population

5.4.2.2. *Kuruchiyan* pepper fields

5.4.2.3. *Mullakuruman* pepper fields

5.4.2.4. *Wayanadan Chetti* pepper fields

5.4.2.5. Certified organic pepper fields

5.4.2.6. Conventional pepper fields

5.4.3. Diversity of AM fungi

6. **SUMMARY**

7. **REFERENCES**