

Lists of Tables

		Pages
Table 1.1	Study sites of Meitei inhabiting Valley Districts	14
Table 3.1	: List of ten selected natural dye-yielding plants for the biochemical analysis	64
Table 3.2	: List of two selected plants used as alkaline and acidic mordants for mineral analysis	64
Table 4.1	: Lists of Plants used as Natural Dye Yielding Plants of Manipur	104-107
Table 4.2	: Lists of plants used as Alkaline mordant	128
Table 4.3	: Lists of plants used as acidic mordants	140
Table 4.4	: Pigments responsible for dyeing in ten selected natural dye yielding plants of Manipur (mg/g) mean \pm S. Em	144
Table 4.5	: Micro- and micro-element contents (mg/g) of the two plants used as mordant (Mean \pm S. Em)	144
Table 4.6	: Distribution of <i>Strobilanthes cusia</i> (Nees) Kuntze in the four valley districts of Manipur	146
Table 4.7	: Distribution of <i>Strobilanthes cusia</i> (Nees) Kuntze in the five hill districts of Manipur	146
Table 4.8	: Fastness Grades (Washing and Rubbing) of cotton, silk and woollen yarns dyed with <i>Kum</i> dye (Fermented leaves and young shoots of <i>S. cusia</i>) using 10% $Al_2(SO_4)_3$, 2% $CuSO_4$, 2% $FeSO_4$ and 2% $K_2Cr_2O_7$ as chemical mordants	159
Table 4.9	: Tensile strength and elongation % of cotton, silk and woollen yarns dyed with <i>Kum</i> dye (Fermented leaves and young shoots of <i>S. cusia</i>) using 10% $Al_2(SO_4)_3$, 2% $CuSO_4$, 2% $FeSO_4$ and 2% $K_2Cr_2O_7$ as chemical mordants and tensile strength and	160

	elongation % of grey yarn	
Table 4.10	: Fastness Grade (Rubbing & Washing) of cotton, silk and woollen yarns dyed hot condition using both alkaline mordents (<i>Achyranthes aspera</i> L.) and acidic mordant (<i>Garcinia pedunculata</i> Roxb.) and fermented <i>kum</i> in different ratio	161
Table 4.11	: Tensile strength and elongation % of cotton, silk and woollen yarns dyed hot condition using both alkaline mordents (<i>Achyranthes aspera</i> L.) and acidic mordant (<i>Garcinia pedunculata</i> Roxb.) and fermented <i>kum</i> in different ratio and tensile strength and elongation % of grey yarn	162
Table 4.12	: Fastness Grade (Rubbing & Washing) of cotton, silk and woollen yarns dyed in traditional cold method using <i>Kum sunu</i> , alkaline mordants (<i>Achyranthes aspera</i> L.) and acidic mordant (<i>Garcinia pedunculata</i> Roxb.) and fermented <i>Kum</i> in different ratio	163
Table 4.13	: Tensile strength and elongation % of cotton, silk and woollen yarns dyed in traditional cold method using <i>Kum sunu</i> , alkaline mordants (<i>Achyranthes aspera</i> L.) and acidic mordant (<i>Garcinia pedunculata</i> Roxb.) and fermented <i>Kum</i> in different ratio and tensile strength and elongation % of grey yarn	164
Table 4.14	: Morphological Studies of the Bacteria	166
Table 4.15	: Biochemical Test of the Bacteria	167
Table 4.16	: Physiological test of the Bacteria	168
Table 4.17	: Acid Production from Carbohydrates	169

Lists of Figures

	Pages
Fig. 1.1 : Map of Manipur showing the nine districts	10
Fig. 1.2 : Traditional method of <i>kum</i> dyeing	13
Fig. 1.3 : Map of the four valley districts inhabited by the Meitei communities showing the eight selected study sites	15
Fig. 4.1 : Histogram showing different category of plant species used as NDYPs based on their distribution pattern	121
Fig. 4.2 : Pie charts showing the % plants parts used as source of natural dye	121
Fig. 4.3 : Histogram showing different category of plant species used as Alkaline mordant based on their distribution pattern	127
Fig. 4.4 : Pie charts showing the % plants parts used as source of Alkaline mordant	127
Fig. 4.5 : Histogram showing different category of plant species used as Alkaline mordant based on their distribution pattern	139
Fig. 4.6 : Pie charts showing the % plants parts used as source of Alkaline mordant	139
Fig. 4.7 : Distribution map of <i>Strobilanthes cusia</i> (Nees) Kuntze in Imphal West District	147
Fig. 4.8 : Distribution map of <i>Strobilanthes cusia</i> (Nees) Kuntze in Imphal East District	148
Fig. 4.9 : Distribution map of <i>Strobilanthes cusia</i> (Nees) Kuntze in Bishnupur District	149
Fig. 4.10 : Distribution map of <i>Strobilanthes cusia</i> (Nees) Kuntze in Thoubal District	150
Fig. 4.11 : Distribution map of <i>Strobilanthes cusia</i> (Nees) Kuntze in Chandel District	151
Fig. 4.12 : Distribution map of <i>Strobilanthes cusia</i> (Nees) Kuntze in Churachandpur District	152

- Fig. 4.13** : Distribution map of *Strobilanthes cusia* (Nees) Kuntze in 153
Tamenglong District
- Fig. 4.14** : Distribution map of *Strobilanthes cusia* (Nees) Kuntze in 154
Senapati District
- Fig. 4.15** : Distribution map of *Strobilanthes cusia* (Nees) Kuntze in 155
Ukhrul District
- Fig. 4.16** : Phylogenetic tree of *Lysinibacillus fusiformis* and other close 170
relatives bacterial strains based on a comparison of ca. 1000
bases constructed using the neighbour-joining method using
MEGA 5.05 software

List of Photo

- PLATE- I** a) *Areca catechu* L.; b) *Bauhinia variegata* L.; c) *Bauhinia purpurea* L.; d) *Bixa orellana* L.; e) *Brassica campestris* L.; f) *Camellia sinensis* L. Kuntze; g) *Carthamus tinctorius* L.; h) *Celosia argentea* L.
- PLATE- II** a) *Clerodendrum philippinum* Schauer; b) *Clitoria ternatea* L.; c) *Curcuma domestica* Val.; d) *Cuscuta reflexa* Roxb.; e) *Datura metel* L.; f) *Eclipta prostrata* L.; g) *Erythrina stricta* Roxb.; h) *Hibiscus rosa sinensis* L.; i) *Impatiens balsimina* L.
- PLATE- III** a) *Mahonia manipurensis* Takeda.; b) *Mallotus philippensis* (Lam.) Muell.; c) *Melanorrhoea usitata* Wall.; d) *Melastoma malabathricum* L.; e) *Melia azadarach* L.; f) *Parkia timoriana* (A.DC.) Merr.; g) *Pasania pachyphylla* Schot.; h) *Phyllanthus emblica* L.; i) *Piper betle* L.
- PLATE- IV** a) *Punica granatum* L.; b) *Psidium guajava* L.; c) *Rubia cordifolia* L.; d) *Solanum nigrum* L.; e) *Strobilanthes cusia* (Nees) Kuntze; f) *Tectona grandis* L.f.; g) *Tagetes erecta* L.; h) *Terminalia citrina* Roxb.; i) *Zizania latifolia* Turzc. ex Stapf
- PLATE- V** a) *Ananas comosus* Merr.; b) *Averrhoa carambola* L.; c) *Citrus jambhiri* Lush.; d) *Citrus maxima* (Burn.)Merr.; e) *Garcinia pedunculata* Roxb.; f) *Mangifera indica* L. g) *Phyllanthus emblica* L.; h) *Rhus semialata* L.
- PLATE- VI** a) *Achyranthes aspera* L.; b) *Cajanus cajan* (L.) Millsp ; c) *Ficus hispida* (L.) f.; d) *Grevillea robusta* A. Cunn.; e) *Hedychium coronarium* J. Koenig; f) *Hedychium greenii* W.W.Sm.; g) *Hedychium spicatum* Buch-Ham. Ex Smith.; h) *Musa sapientum* L.; i) *Nicotiana tabaccum* L.; j) *Pisum sativum* L.; k) *Zanthoxylum acanthopodium* DC.
- PLATE- VII** SEM Photograph of Kum Reducing bacterium *Lysinnibacillus fusiformis*