

List of figures

Figure 1 Environmental impacts of the Green Revolution and need for sustainable agriculture.....	2
Figure 2 Pesticide consumption in India versus the world.....	4
Figure 3 Pest Percentage in agricultural fields of Vadodara.....	8
Figure 4 Agricultural fields of Castor in Savli, Vadodara, Gujarat.....	8
Figure 5 Agricultural fields of Cabbage in Chhani, Vadodara, Gujarat.....	9
Figure 6 Damage assessed in Cotton fields, Savli, Vadodara, Gujarat.....	9
Figure 7 Damage of <i>Spodoptera litura</i> in Castor leaf.....	9
Figure 8 Tomato leaf infested by <i>Spodoptera litura</i>	10
Figure 9 The leaf of cabbage showing feeding of <i>Spodoptera litura</i>	10
Figure 10 Egg mass of <i>Spodoptera litura</i> underside of Castor leaf.....	11
Figure 11 Castor leaf completely damaged by <i>Spodoptera litura</i>	11
Figure 12 The conceptual diagram of resistance development in insect pests.	12
Figure 13 IRAC mode of action classification of insecticides.....	26
Figure 14 The satellite image of the state of Gujarat indicating different district.....	28
Figure 15 The district map of Gujarat indicating the study location of research.....	29
Figure 16 District-wise distribution of agricultural crops in Gujarat.....	49
Figure 17 Area covered by agricultural crops in 2018-2019 in Gujarat.....	30
Figure 18 Advance estimate of Area and yield of crops in Gujarat in 2019-2020.....	32
Figure 19 Heavy infestation of <i>Spodoptera litura</i>	36
Figure 20 Damage symptoms observed in Castor leaf.....	36

Figure 21 Damage symptoms observed in tomato leaf.....	37
Figure 22 Damage symptoms observed in the crop of maize.....	37
Figure 23 Damage symptoms observed in the crop of cabbage.....	37
Figure 24 Life cycle of <i>Spodoptera litura</i> maintained in laboratory conditions.....	38
Figure 25 Artificial diet for rearing of <i>Spodoptera litura</i>	42
Figure 26 Hatching of larvae taken with care by Camlin brush.....	40
Figure 27 First instar larvae of <i>S.litura</i> transferred on artificial diet.....	40
Figure 28 Second instar larvae of <i>S.litura</i> reared on artificial diet.....	42
Figure 29 Pre-fourth and Fourth instar larvae of <i>Spodoptera litura</i> on artificial diet.....	42
Figure 30 Healthy pupae of <i>Spodoptera litura</i> reared in laboratory.....	42
Figure 31 Oviposition cages, larval culture of <i>Spodoptera litura</i>	44
Figure 32 Careful rearing of <i>Spodoptera litura</i> done in laboratory.....	44
Figure 33 Different concentrations of insecticide solutions.....	50
Figure 34 Healthy cotton leaf for leaf-dip bioassay.....	50
Figure 35 Leaf discs cut out of healthy cotton leaf.....	50
Figure 36 Symptomatology parameters after exposure to insecticides.....	56
Figure 37 Graph representing resistance developed in Cypermethrin at 0.5 ppm.....	60
Figure 38 Graph representing resistance developed in at 0.05 ppm.....	63
Figure 39 Graph representing resistance developed in Spinosad at 1 ppm.....	63
Figure 40 Graph representing resistance developed in 1 ppm of Coragen 20SC.....	73