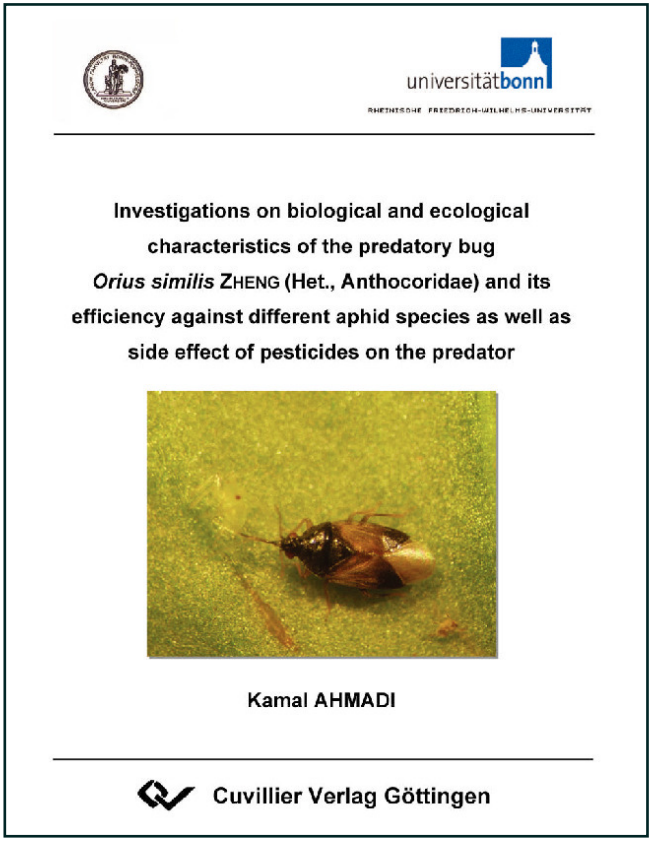
Kamal Ahmadi (Autor)

Investigations on biological and ecological characteristics of the predatory bug Orius similis ZHENG (Het., Anthocoridae) and its efficiency against different aphid species as well as side effect of pesticides on the predator



universitätbonn

RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITÄT

Investigations on biological and ecological characteristics of the predatory bug *Orius similis* ZHENG (Het., Anthocoridae) and its efficiency against different aphid species as well as side effect of pesticides on the predator

Kamal AHMADI

Cuvillier Verlag Göttingen

https://cuvillier.de/de/shop/publications/1484

Copyright:
Cuvillier Verlag, Inhaberin Annette Jentzsch-Cuvillier, Nonnenstieg 8, 37075 Göttingen, Germany
Telefon: +49 (0)551 54724-0, E-Mail: info@cuvillier.de, Website: https://cuvillier.de

CONTENTS Page

1 INTRODUCTION……..1

2 MATERIAL AND METHODS……..……..……3

2.1 Laboratory experiments……..……3

2.1.1 Rearing of insects…….……3

2.1.1.1 Rearing of aphid species as prey…….……3

2.1.1.2 Rearing of *Orius similis*…….……4

2.1.1.3 Rearing of other insects and mites…….……5

2.1.1.3.1 Prey species……...……5

2.1.1.3.2 *Dicyphus tamaninii*……...……5

2.1.2 Procedures of the experiments…….……6

2.1.2.1 Biology and prey consumption of *Orius similis*……...…….6

2.1.2.1.1 Biology of *Orius similis*…….……6

2.1.2.1.1.1 Embryonic and nymphal development as well as mortality…….……6

2.1.2.1.1.2 Longevity……...……7

2.1.2.1.1.3 Fecundity……..……7

2.1.2.1.1.3.1 Oviposition period…….……7

2.1.2.1.1.3.2 Daily and total fecundity by feeding different aphid species……..……7

2.1.2.1.1.3.3 Oviposition at different environmental condition……7

2.1.2.1.2 Prey consumption of *Orius similis*……..……10

2.1.2.1.2.1 Prey consumption of the nymphal instars……...11

2.1.2.1.2.2 Prey consumption of the adults……...…11

2.1.2.1.2.3 Prey consumption by changing prey offer……..11

2.1.2.1.2.4 Prey consumption by different nutritional sources during nymphal development on prey consumption of adults….……12

2.1.2.1.2.5 Prey consumption preferences……12
2.1.2.1.2.5.1 Preference to different aphid species……..……13
2.1.2.1.2.5.2 Preference to different prey species of different orders……..…...13
2.1.2.2 Biology and prey consumption of *Orius similis* at low and high temperatures……..…14
2.1.2.2.1 Biology of *Orius similis*……...……14
2.1.2.2.1.1 Embryonic and nymphal development as well as mortality……...……14
2.1.2.2.1.2 Longevity……14
2.1.2.2.1.2.1 Longevity at low and high temperatures……..……14
2.1.2.2.1.2.2 Longevity with different nutritional sources……15
2.1.2.2.1.3 Fecundity……15
2.1.2.2.2 Prey consumption of *Orius similis*……...……16
2.1.2.2.2.1 Prey consumption of the nymphal instars……...16
2.1.2.2.2.2 Prey consumption of the adults……...…16
2.1.2.3 Egg-laying preferences of *Orius similis*……..……17
2.1.2.3.1 Preference to different substrates……...……17
2.1.2.3.2 Preference to different nutritional sources……...18
2.1.2.3.3 Preference to light and dark area……18
2.1.2.4 Cannibalism and intraguild predation on *Dicyphus tamaninii*……19
2.1.2.4.1 Cannibalism by *Orius similis*……...……20
2.1.2.4.2 Intraguild predation between *Orius similis* and *Dicyphus tamaninii*……..……20
2.1.2.5 Side-effect of selected pesticides on *Orius similis*……..……21
2.1.2.5.1 Acute toxicity to *Orius similis*……22
2.1.2.5.1.1 Acute toxicity to eggs……..……22

2.1.2.5.1.2 Acute toxicity to nymphal instars……..……22
2.1.2.5.1.3 Acute toxicity to adults……...…22
2.1.2.5.2 Effect of indoxacarb and pirimicarb on the biology of *Orius similis*……..……23
2.1.2.5.3 Effect of indoxacarb and pirimicarb on the prey consumption of *Orius similis*…….……24
2.2 Greenhouse experiments……...……25
2.3 Statistical analysis…….……25

3 RESULTS……..…27
3.1 Laboratory experiments…….…27
3.1.1 Biology and prey consumption of *Orius similis*……...…..……27
3.1.1.1 Biology of *Orius similis*……...……27
3.1.1.1.1 Embryonic and nymphal development……...……27
3.1.1.1.2 Mortality…….……29
3.1.1.1.3 Longevity…….…30
3.1.1.1.4 Fecundity……31
3.1.1.1.4.1 Oviposition period……..……31
3.1.1.1.4.2 Daily and total fecundity by feeding different aphid species……...……32
3.1.1.1.4.3 Oviposition at different environmental condition…….……34
3.1.1.1.4.3.1 At the different photoperiods…...34
3.1.1.1.4.3.2 At the different nutritional sources…….……35
3.1.1.1.4.3.3 At the different substrates……37
3.1.1.1.4.3.4 At the presence of *Dicyphus tamaninii* adults……37
3.1.1.2 Prey consumption of *Orius similis*……...……38
3.1.1.2.1 Prey consumption of the nymphal instars……...…38

3.1.1.2.2 Prey consumption of the adults……..……40
3.1.1.2.3 Prey consumption by changing prey offer……..…42
3.1.1.2.4 Prey consumption by different nutritional sources during nymphal development on prey consumption of adults…...…45
3.1.1.2.5 Prey consumption preferences……46
3.1.1.2.5.1 Preference to different aphid species……..…46
3.1.1.2.5.2 Preference to different prey species of different orders……..……46
3.1.2 Biology and prey consumption of *Orius similis* at low and high temperatures….49
3.1.2.1 Biology of *Orius similis*……...……49
3.1.2.1.1 Embryonic and nymphal development……...……49
3.1.2.1.2 Mortality…….……51
3.1.2.1.3 Longevity…….…51
3.1.2.1.3.1 Longevity at low and high temperatures…….51
3.1.2.1.3.2 Longevity with different nutritional sources…..52
3.1.2.1.4 Fecundity……53
3.1.2.2 Prey consumption of *Orius similis*……...……56
3.1.2.2.1 Prey consumption of the nymphal instars……...……56
3.1.2.2.2 Prey consumption of the adults……...……58
3.1.3 Egg-laying preferences of *Orius similis*……60
3.1.3.1 Preference to different substrates…….……60
3.1.3.2 Preference to different nutritional sources……...……62
3.1.3.3 Preference to light and dark area……...……..……62
3.1.4 Cannibalism and intraguild predation on *Dicyphus tamaninii*……..……63
3.1.4.1 Cannibalism by *Orius similis*……...……63
3.1.4.2 Intraguild predation between *Orius similis* and *Dicyphus tamaninii*…..65
3.1.5 Side-effect of selected pesticides on *Orius similis*……66
3.1.5.1 Acute toxicity to *Orius similis*…….……66
3.1.5.1.1 Acute toxicity to eggs…….……66
3.1.5.1.2 Acute toxicity to nymphal instars……...……67

3.1.5.1.3 Acute toxicity to adults……...……69

3.1.5.3 Effect of indoxacarb and pirimicarb on the biology of *Orius similis*…..71

3.1.5.3.1 Embryonic development……..……71

3.1.5.3.2 Nymphal development and mortality…….……72

3.1.5.3.3 Longevity…….……73

3.1.5.3.4 Fecundity……74

3.1.5.4 Effect of indoxacarb and pirimicarb on the prey consumption of *Orius similis*…….……75

3.2 Greenhouse experiments……...……76

4 DISCUSSION……...……79

SUMMARY…….……..99

REFERENCES……102