

Table of Contents

CHAPTER I	1
General Introduction and outline of the thesis	
1. Fusarium head blight in wheat	2
2. Taxonomy	2
3. Epidemiology	3
4. Effect of climatic conditions on Fusarium head blight species	4
5. Effect of plant production measures used against Fusarium head blight	6
6. Mycotoxins produced by major <i>Fusarium</i> species	7
6.1. Trichothecenes	7
6.2. Zearalenones	8
6.3. Moniliformin	10
7. Outline of this thesis	11
References	12
CHAPTER II	17
Quantifying the effects of previous crop, tillage, cultivar, and triazole fungicides on the deoxynivalenol content of wheat grain	
Abstract	18
1. Introduction	19
2. Distribution of DON contents	19
3. Previous crop	20
4. Tillage	21
5. Cultivars	21
6. Fungicides	24
7. Nitrogen fertilization and growth regulators	25
8. Conclusion	26
Acknowledgements	27
References	28

CHAPTER III	33
Effects of cultivar, cultivation practices, geographic location, and climatic conditions on the <i>Fusarium</i> species complex composition in wheat heads	
Abstract	34
1. Introduction	35
2. Material and methods	36
2.1. Area surveyed	37
2.2. Sampling	38
2.3. Cultivation	38
2.4. DNA extraction	38
2.5. PCR analysis	38
2.6. Climatic conditions	39
2.5. Statistical analysis	39
3. Results	41
3.1. Influence of wheat cultivar on the <i>Fusarium</i> species complex composition	41
3.2. Sampling years	42
3.3. Cultivation practice	42
3.4. Spatial distribution	43
3.5. Climatic conditions	45
3.6. Detected species combinations on wheat ears	46
4. Discussion	47
4.1. <i>Fusarium</i> complex composition	47
4.2. Effects of climatic conditions, longitude and latitude	48
4.3. Influence of agricultural practice	50
4.4. Species combinations	51
5. Conclusions	52
Acknowledgements	52
References	53

CHAPTER IV	57
Comparison of the declining triazole sensitivity of <i>Gibberella zeae</i> and increased sensitivity achieved by advances in triazole fungicide development	
Abstract	58
1. Introduction	59
2. Materials and methods	60
2.1. <i>Fusarium</i> isolates	60
2.2. <i>In vitro</i> production of Ascospores	61
2.3. Sensitivity tests	61
2.4. Statistical analysis	63
3. Results	64
4. Discussion	66
4.1. Inhibition of ascospore germination by triazoles	66
4.2. Considerations on cross resistance	66
4.3. Comparison of <i>in vivo</i> and <i>in vitro</i> performance of epoxiconazole	66
4.4. Advances in fungicide development versus declining fungal sensitivity	67
4.5. Ranking triazoles by efficacy and toxicity	69
4.6. Estimating critical water volumes for commercial field applications	70
Acknowledgements	70
References	71
CHAPTER V	75
General discussion	
1. <i>Fusarium</i> species in wheat heads	76
2. Effect of climatic conditions on the FHB species complex composition	79
3. Effect of plant production measures on FHB species complex and DON content	80
3.1. Wheat cultivar	81
3.2. Previous crop	81
3.3. Tillage	82
3.4. Triazole effects on <i>Gibberella zeae</i>	83
3.5. Effects triazoles on selected <i>Fusarium</i> species	87
4. Conclusion	90
References	92

SUMMARY	100
ZUSAMMENFASSUNG	105
DANKSAGUNG	108
CURRICULUM VITAE	109
APPENDIX	111
APPENDIX I	112
1. Analysis of CYP51 gene sequences in isolates of <i>F. graminearum</i>	112
2. Multiple sequence alignment of nucleotide sequences	114
3. Multiple sequence alignment of amino acid sequences	118
APPENDIX II	119
Effect of selected triazoles on different <i>Fusarium</i> species	119
1.1. Fungal material	119
1.2. Sensitivity assays	120
1.3. Statistical analysis	120