



## Inhaltsverzeichnis

I. Einleitung .....	1
II. Artikel 1: .....	8
Phenotype related differences in frost tolerance of winter sugar beet ( <i>Beta vulgaris</i> L.) .....	8
Abstract .....	8
1. Introduction .....	9
2. Materials and methods .....	10
2.1 Site conditions .....	10
2.2 Experimental design .....	11
2.3 Leaf area index.....	12
2.4 Crown height .....	12
2.5 Taproot analyses .....	12
2.6 Plant survival .....	12
2.7 Temperature measurements .....	13
2.8 Water distribution in taproot crown .....	13
2.9 Statistical analyses .....	14
3. Results.....	15
3.1 Canopy and taproot characteristics .....	15
3.2 Survival rates.....	15
3.3 In-taproot temperature.....	19
3.4 Water distribution in taproot crown .....	20
4. Discussion .....	21
5. Conclusions .....	25
6. Acknowledgement.....	25
7. References .....	26
III. Artikel 2: .....	28
Modeling crown temperature of winter sugar beet and its application in risk assessment for frost killing in Central Europe.....	28
Abstract .....	28



## Inhaltsverzeichnis

1. Introduction .....	29
2. Materials and methods .....	30
2.1 Site conditions .....	31
2.2 Experimental design .....	31
2.3 Temperature measurements .....	31
2.4 Determination of the maximum taproot diameter .....	32
2.5 Determination of a minimum temperature for frost survival .....	32
2.6 Modeling of taproot tissue temperature .....	32
2.7 Risk assessment for frost killing .....	35
3. Results .....	36
3.1 Crown threshold temperature for frost killing .....	36
3.2 Data used for modeling .....	36
3.3 Suitability of basic parameters .....	38
3.4 Best $iR_{Min}$ prediction models .....	38
3.5 Risk assessment for frost killing .....	39
4. Discussion .....	42
4.1 Threshold value for frost killing .....	42
4.2 Modeling minimum crown tissue temperature ( $iR_{Min}$ ) .....	43
4.3 Risk assessment for frost killing .....	45
5. Conclusions .....	46
6. Acknowledgement .....	47
7. References .....	47
IV. Artikel 3: .....	50
Yield of bolting winter beet ( <i>Beta vulgaris</i> L.) as affected by plant density, genotype and environment .....	50
Abstract .....	50
1. Introduction .....	51
2. Materials and methods .....	52
2.1 Field trials and site conditions .....	52
2.2 Harvest and plant analyses .....	53

## Inhaltsverzeichnis

2.3 Statistical analyses .....	54
3. Results .....	55
3.1 Plant density at harvest .....	55
3.2 Weather conditions .....	56
3.3 Dry matter yield .....	57
3.4 Dry matter concentration .....	60
4. Discussion .....	61
5. Acknowledgement .....	65
6. References .....	65
V. Perspektiven der Winterrübe in Mitteleuropa .....	68
Literaturverzeichnis für die Kapitel I und V .....	74
Zusammenfassung .....	77
Lebenslauf .....	79
Danksagung .....	80
Weitere Veröffentlichungen während der Promotion .....	82