

Control of *Rhizoctonia solani* in potatoes with a new application technique of suppressive composts in organic potato production

**Elmar Schulte-Geldermann,
Christian Schüler, Oliver Hensel,
Maria R. Finckh, Christian Bruns**

Dr. C. Bruns
Fachgebiet Ökologischer Land- und Pflanzenbau
Ökologische Agrarwissenschaften U N I K A S S E L



Contents

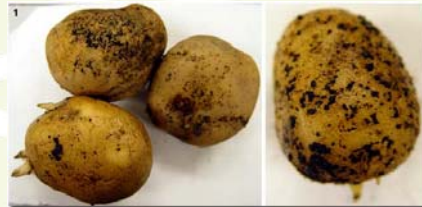
- **Introduction – Importance of *Rhizoctonia solani* in organic potato production**
- **Objectives**
- **Material and methods: Field trial with strip application of composts in potatoes 2006 und 2007**
- **Results**
- **Conclusion and prospects**

Dr. C. Bruns
Fachgebiet Ökologischer Land- und Pflanzenbau
Ökologische Agrarwissenschaften U N I K A S S E L



Importance of *Rhizoctonia solani* in organic potato production

- Soil-borne and seed tuber borne, Saprophyt, Sclerotia can exist at least for 3 years in the soil, 500 hosts (weeds)
- Several targets and symptoms: sprouts, stolons, stems, lenticells, tubers



Dr. C. Bruns
Fachgebiet Ökologischer Land- und Pflanzenbau
Ökologische Agrarwissenschaften U N I K A S S E L



- Reduced number of plants and tubers
- Malformed tubers
- „Dry core“ infested lenticells

- No reliable means are available
- Organic seed is compulsory



Dr. C. Bruns
Fachgebiet Ökologischer Land- und Pflanzenbau
Ökologische Agrarwissenschaften U N I K A S S E L



Aims and objectives

- *We know*
 - Bark, Yard waste composts showed suppressive effects against soil-borne pathogens (Hoitink and Fahy, 1986; Hoitink and Boehm, 1999)
 - Effects are well correlated with increase in microbial biomass and activity, shifts in microbial populations, establishment of specific antagonists
 - Dependence of organic matter decomposition level and applied amount of composts
- ↳ • Is it possible to reduce *Rhizoctonia solani* in potatoes with a direct application of compost in close vicinity of the mother tuber ?
- How is the technical solution ?

Dr. C. Bruns
Fachgebiet Ökologischer Land- und Pflanzenbau
Ökologische Agrarwissenschaften U N I K A S S E L



Material and Methods

Kastenstreuer UKS 150, Fa. Rauch, 5 t dm /ha (Eko-conform)



Dr. C. Bruns
Fachgebiet Ökologischer Land- und Pflanzenbau
Ökologische Agrarwissenschaften U N I K A S S E L



Field trials 2006/2007

Variety : Nicola (second generation)
site: 78 / 70 BP (2006 / 2007); Ø 612 mm; Ø 7,9°C
Design: Split-plot with 4 reps.
Factors:

1. Compost-application – ridge (strip) application


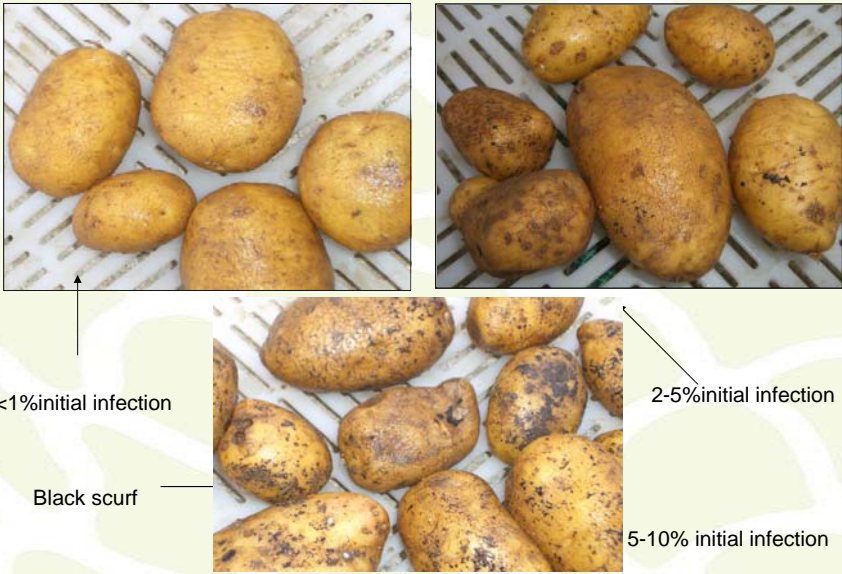
- Compost 1 (5t DM*ha⁻¹) 06/07 60/40 (%) Yard Waste / Biowaste (5 Mo.)
- Compost 2 (5t DM*ha⁻¹) 07 100 (%) Yard Waste (15 Mo.)
- nutrient equivalent control Hornmeal; Rockphosphat; Potassiumsulphate

2. Seed tuber infestation - Sclerotia

- low (< 1%) - medium (2-5 %) - high (> 10%)

- **Further trials :**
- Compost-application : ridge vs. broadcast
- 12 varieties, different maturity

Dr. C. Bruns
 Fachgebiet Ökologischer Land- und Pflanzenbau
 ÖkologischeAgrarwissenschaften U N I K A S S E L


<1%initial infection

Black scurf

2-5%initial infection

5-10% initial infection

Dr. C. Bruns
 Fachgebiet Ökologischer Land- und Pflanzenbau
 ÖkologischeAgrarwissenschaften U N I K A S S E L



Compost Quality

Sample	Compost 2006 (BY)	Compost A 2007 (BY)	Compost B 2007 (Y)
Dry matter (%)	68.97	79.12	47.04
NO ₃ -N mg kg dm ⁻¹	392.01	433.02	127.55
NH ₄ -N mg kg dm ⁻¹	97.96	107.18	8,8
EC (µs * cm ⁻¹)	3102	2920	656
pH	7,65	7,65	7,30
P (mg kg ⁻¹ dm)	2060	1700	1211
K (mg kg ⁻¹ dm)	14400	12000	6957
N _t (%)	1,81	1,71	1,48
C _t (%)	20.97	17.69	20.43
C-N Ratio	11.6 : 1	10.3 : 1	13.8 : 1

Dr. C. Bruns
Fachgebiet Ökologischer Land- und Pflanzenbau
Ökologische Agrarwissenschaften U N I K A S S E L

Assessments

Infestation of stems and tubers
EPPO - Standard 1/32 (2)
- *Rhizoctonia solani* in Potatoes

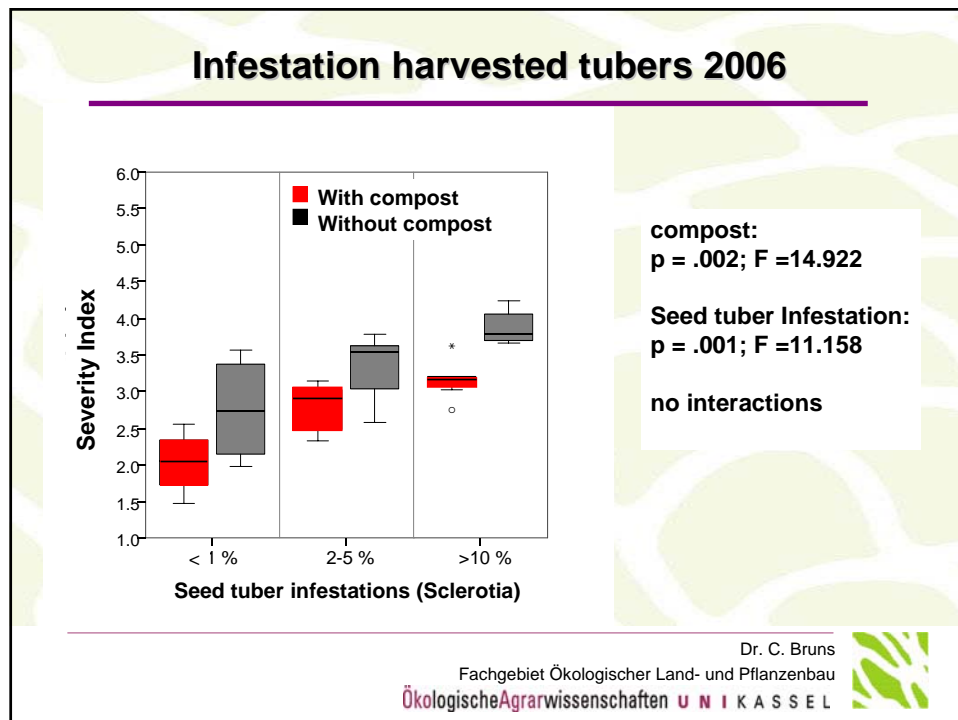
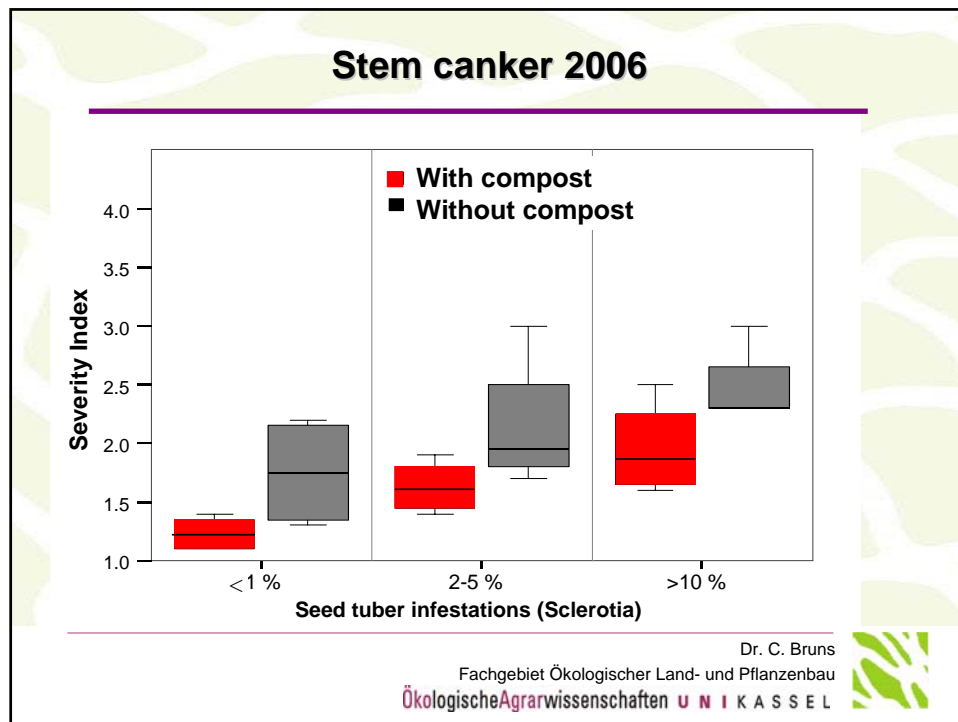
Yield structure, marketable yield

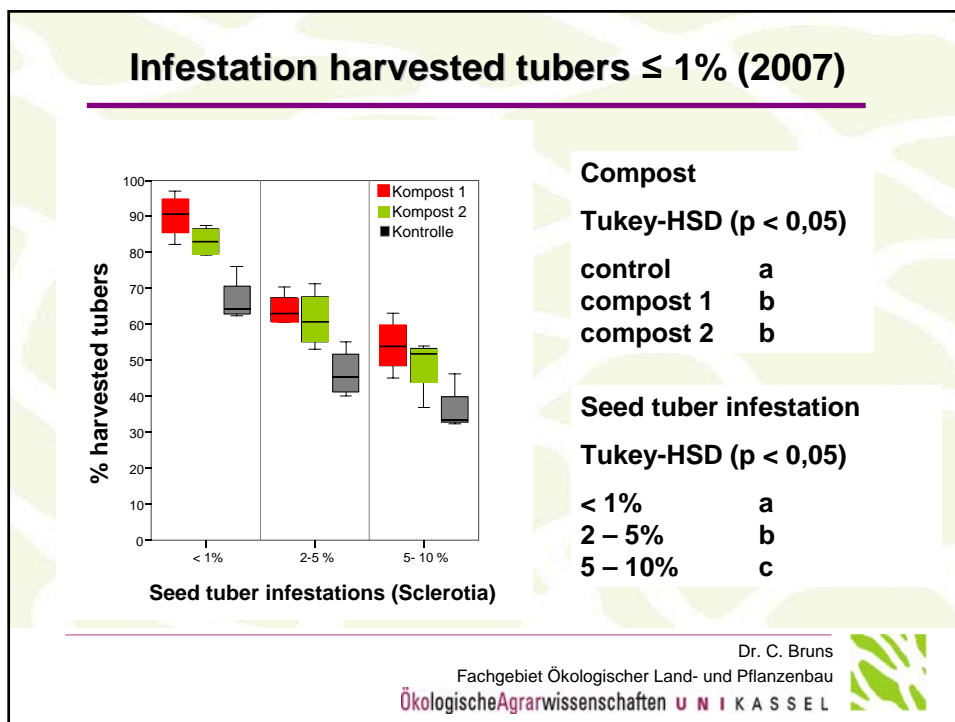
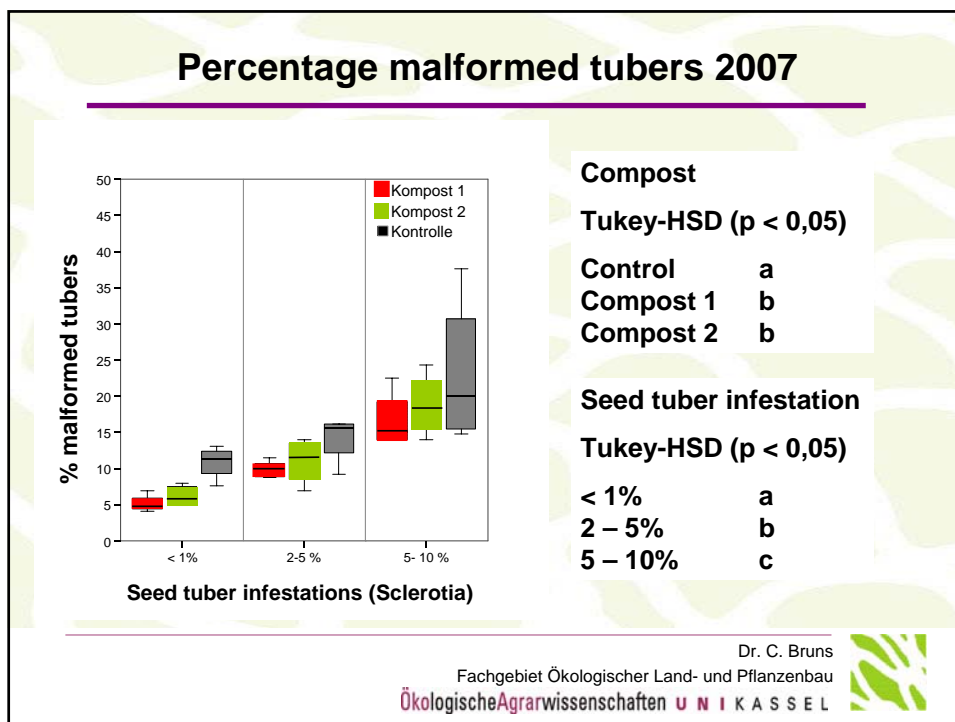
Anhang II – Boniturhilfe

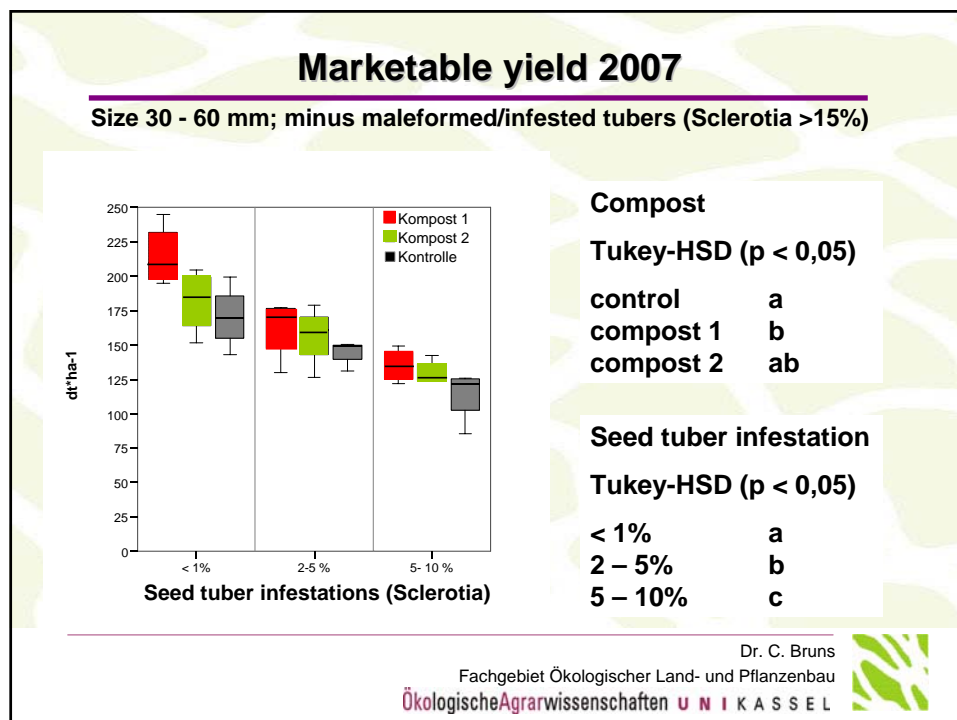
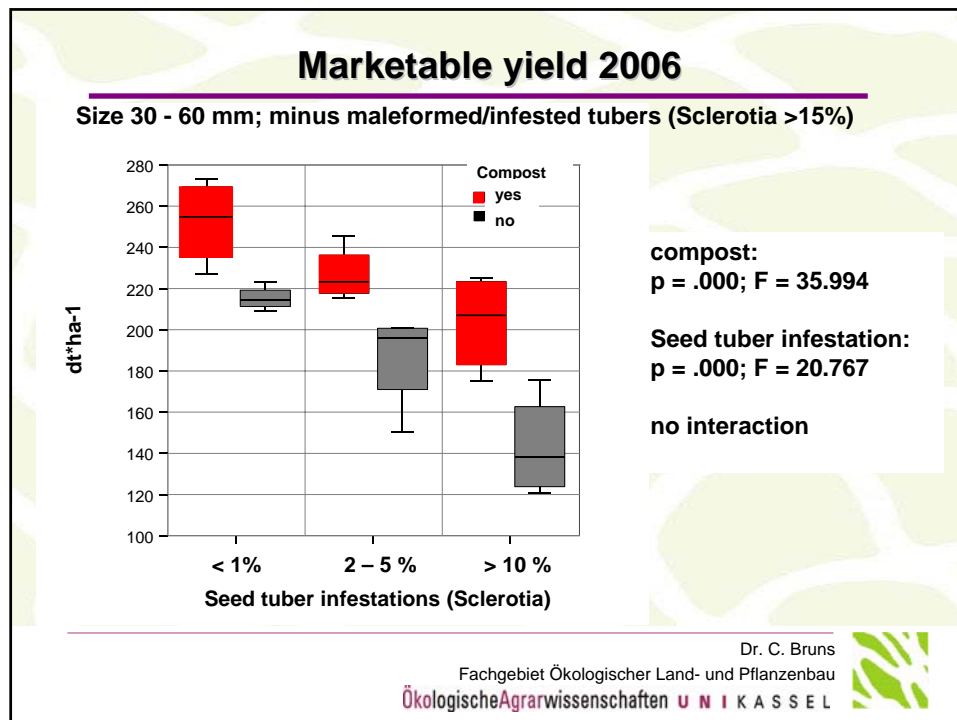
Sclerotien von *Rhizoctonia solani* auf Kartoffelknollen (% befallener Knollenoberfläche)

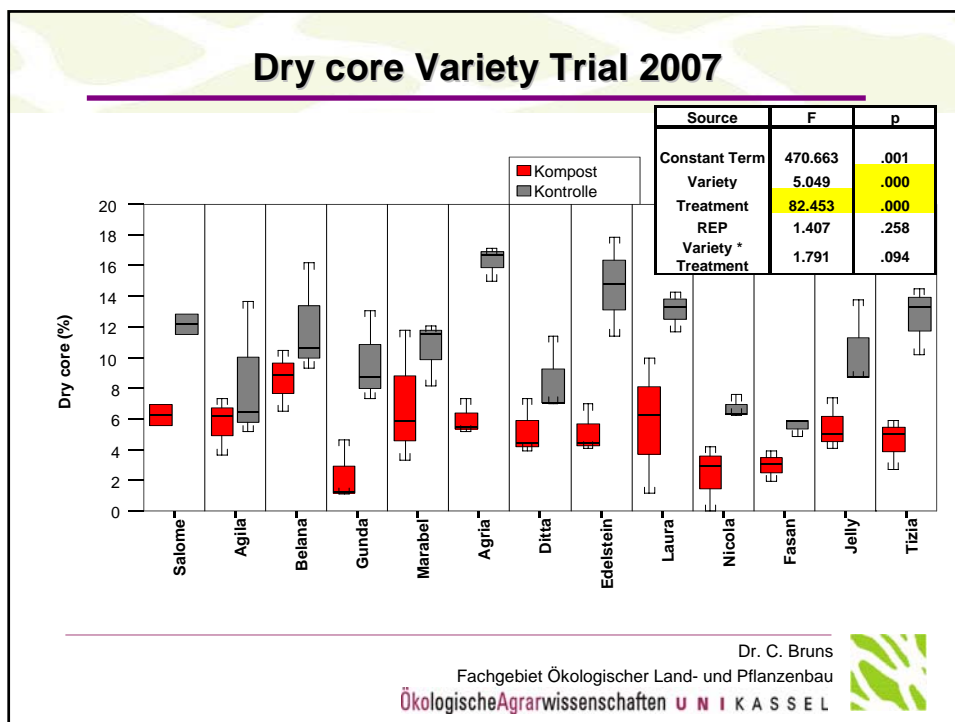
Nach James, W.C. & McKenzie, A.R. (1972). *American Potato Journal* 49: 296-301

Dr. C. Bruns
Fachgebiet Ökologischer Land- und Pflanzenbau
Ökologische Agrarwissenschaften U N I K A S S E L









Conclusion

1. High quality composts
 - reduced all *R. solani* symptoms significantly,
 - reduced the disease in all varieties,
 - increased the marketable yield significantly,
 - This measure needs urgently to be continued
2. The infestation of the seed tubers
 - also had a significant effect.
 - Administrative problem

Dr. C. Bruns
 Fachgebiet Ökologischer Land- und Pflanzenbau
 Ökologische Agrarwissenschaften U N I K A S S E L