Epidemiology and management of Powdery scab in Israel

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Powdery scab Workshop 2014, South Africa

Overview

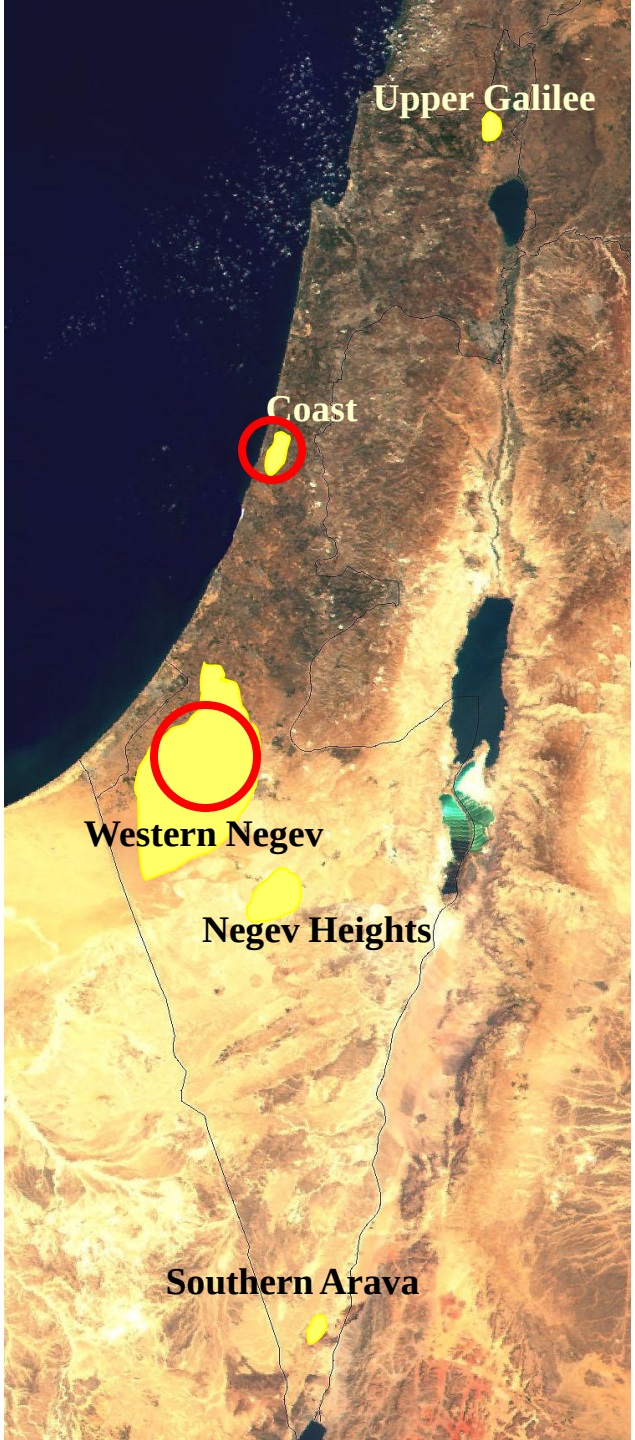
Background
Seed borne inoculum
Cultivar susceptibility
Planting date
Disease increase from haulm killing to harvest
Latent seed infection
Wind dispersal
Control:
Soil treatment; fumigation
Seed treatment

Powdery Scab Occurrence in IL

First reported in IL in 1984
Occurred mostly in Terra Rosa soils @ coast, in recent years prevalent also in sandy soils

Since 2005 – a significant increase due to phase out of Methyl bromide, intensification of potato production, using susceptible cvs., neglecting prevention measures

<u>Causes economic damage</u>:
Downgrade of tuber quality
Reject of contaminated seed lots for the winter



Roots galls and PS symptoms on potato grown in IL

Import regulations

Israeli phyto-sanitaric requirements (partial)

- Brown & ring rot: zero tolerance (field inspection)
- PVY^{NTN}: zero tolerance (tuber inspection)
- *Dickeya* zero tolerance (tuber inspection)

- Blackleg: <0.5% infected plants in the field

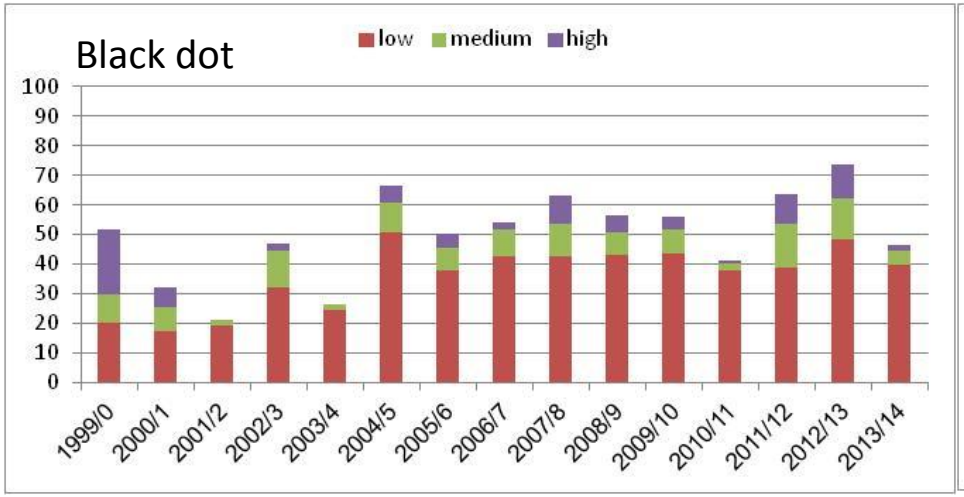
- Common scab: 66% of the tubers <1/6 of surface; 1% - more 5 spots; 0.3% deep scab
- **Powdery scab: 1% of the tubers <1/8 of surface; zero tolerance to cankerous form**
- Black scurf: 10% of tubers (1/8 of tuber surface); 1% higher than 1/8
- Black dot: 30% of tubers (1/3 of tuber surface);

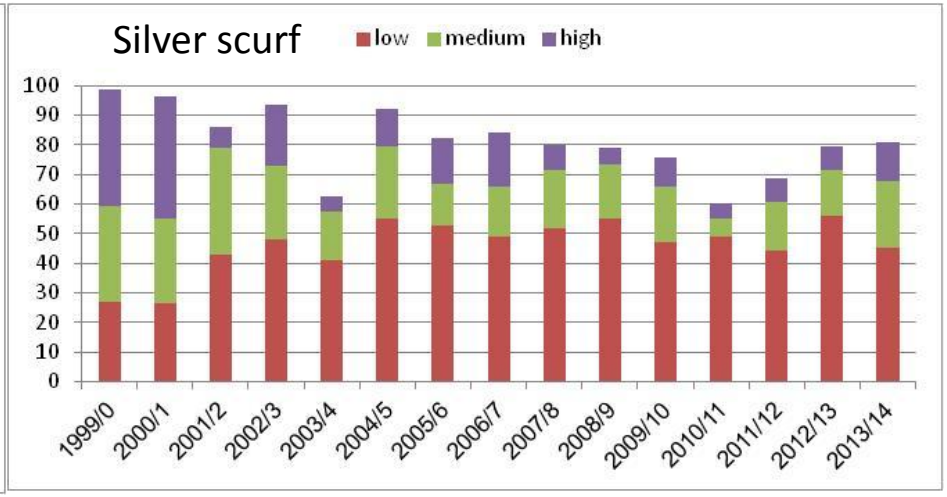
- Late blight: 0.3% of tubers
- Fusarium&Phoma: 1% of tubers

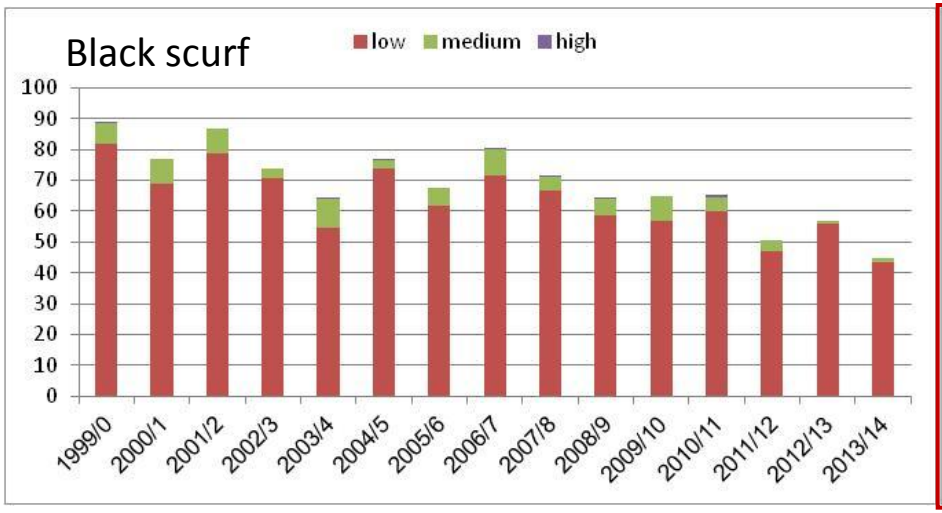
Seed borne inoculum

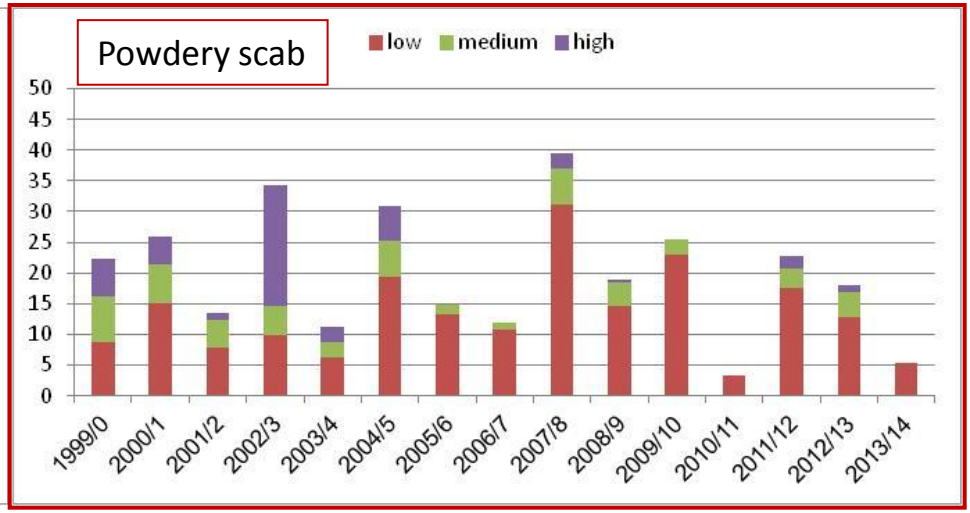
Monitoring seed lots

Sample of 200 tubers/lot

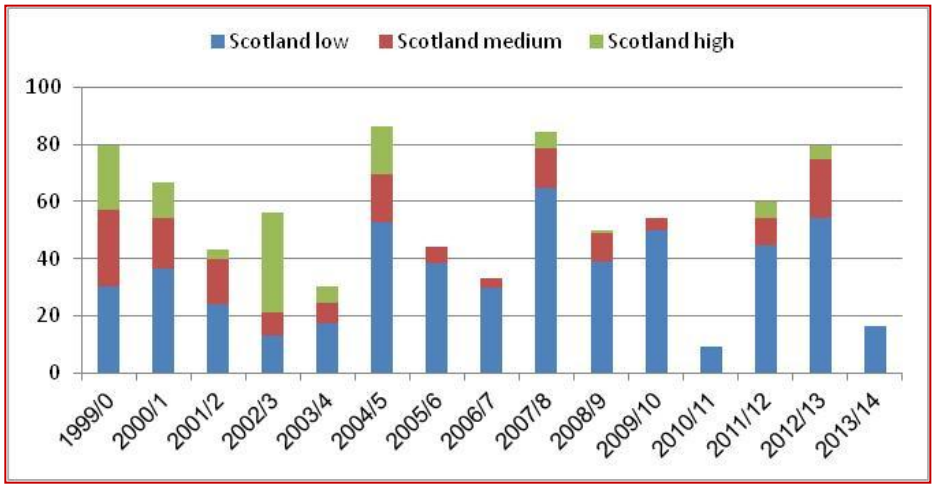


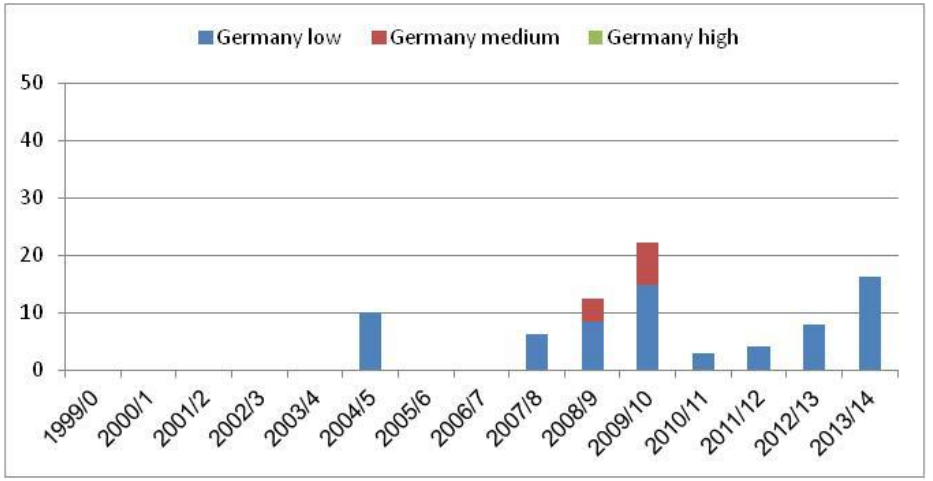


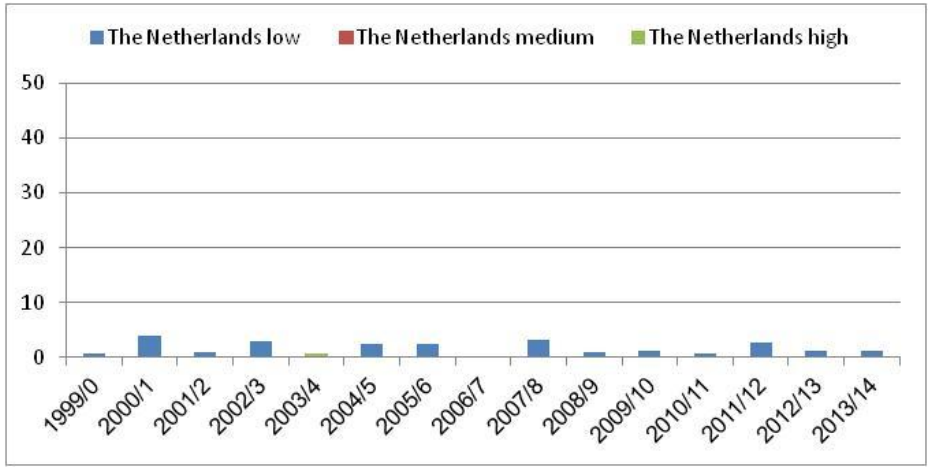


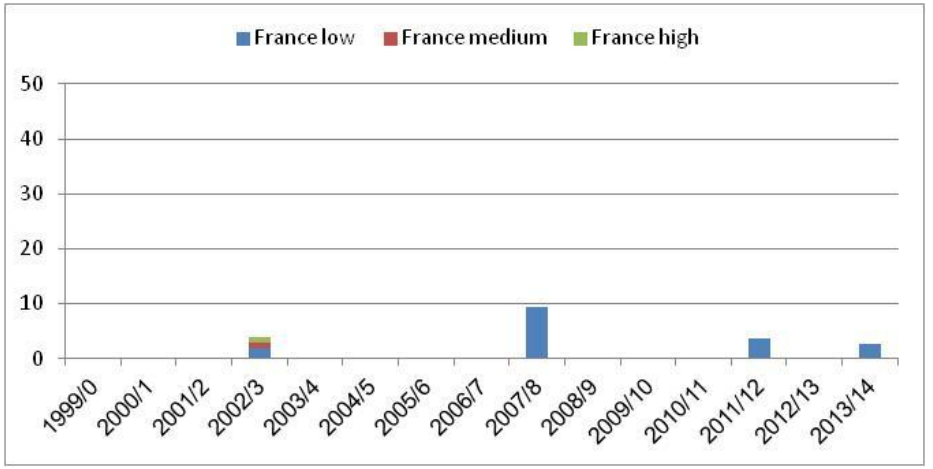


Monitoring seed lots



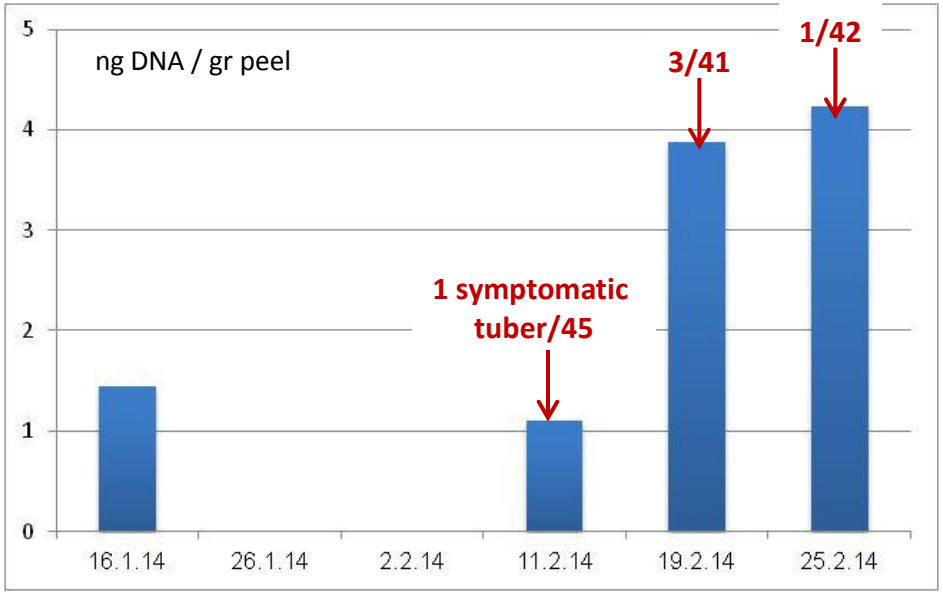






Latent infection of tubers

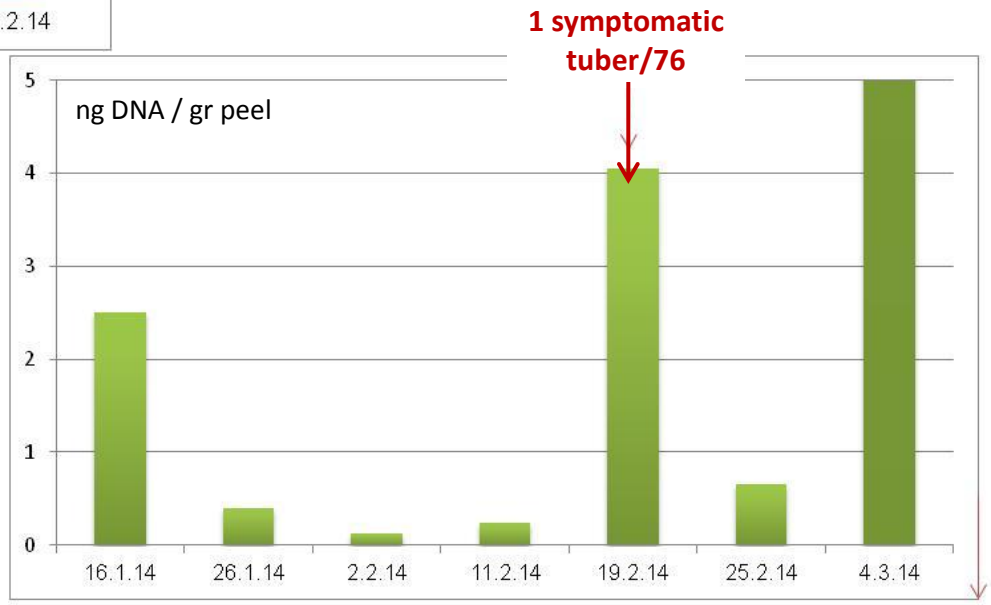
Field trial, Winter 2013-14



Planting: 15/11/13; Annabelle

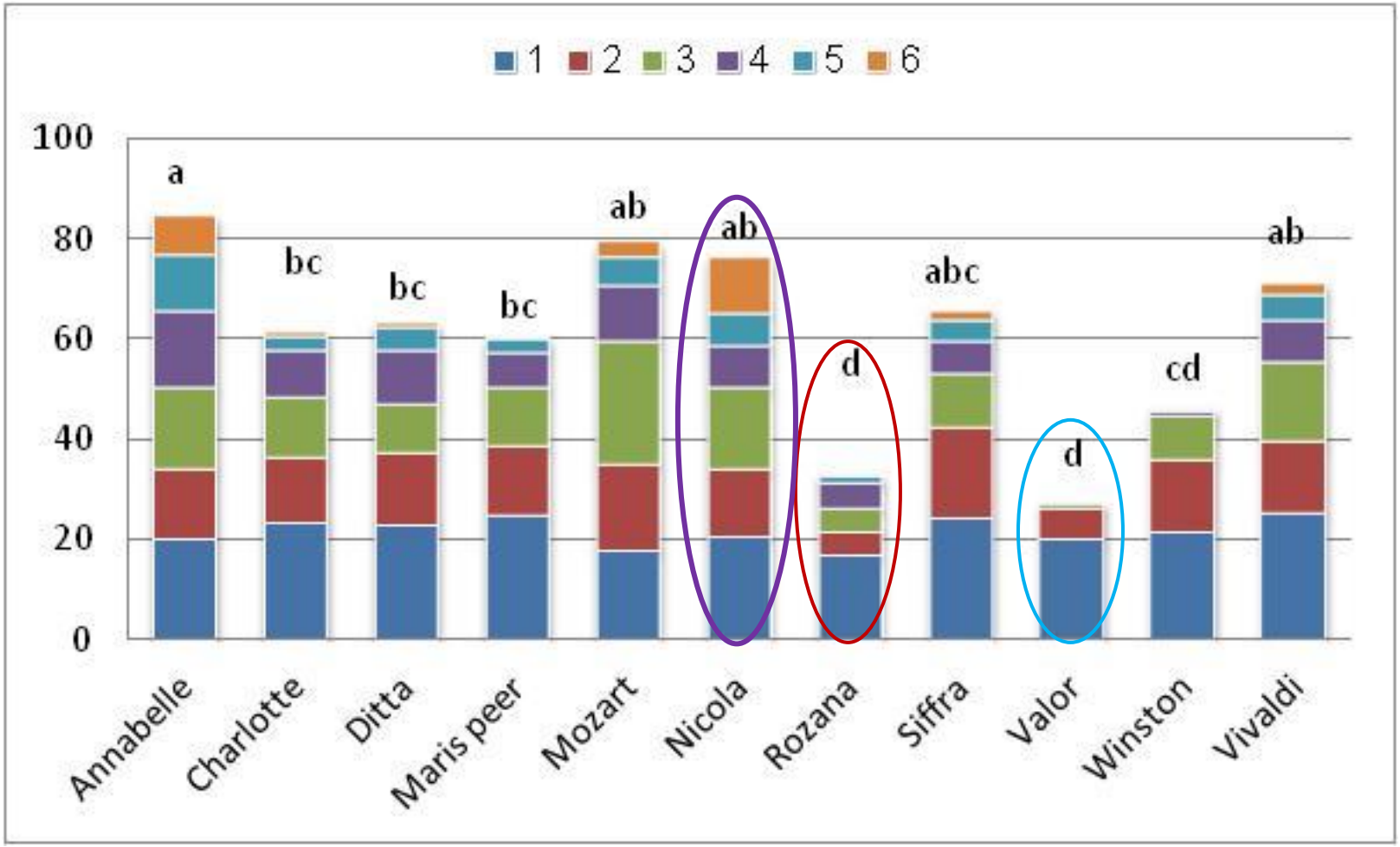
Tubers were weekly sampled (50-60DAP; in groups of 10). Only symptomless tubers were gently peeled ; DNA was extracted from 30 mg peel using Maxwell 16 Tissue DNA Purification Kit; RT-PCR analysis [2 reps] (Lees et al, 2003)

Planting: 25/11/13; Maris peer



Assessment of cultivars to PS incidence & severity

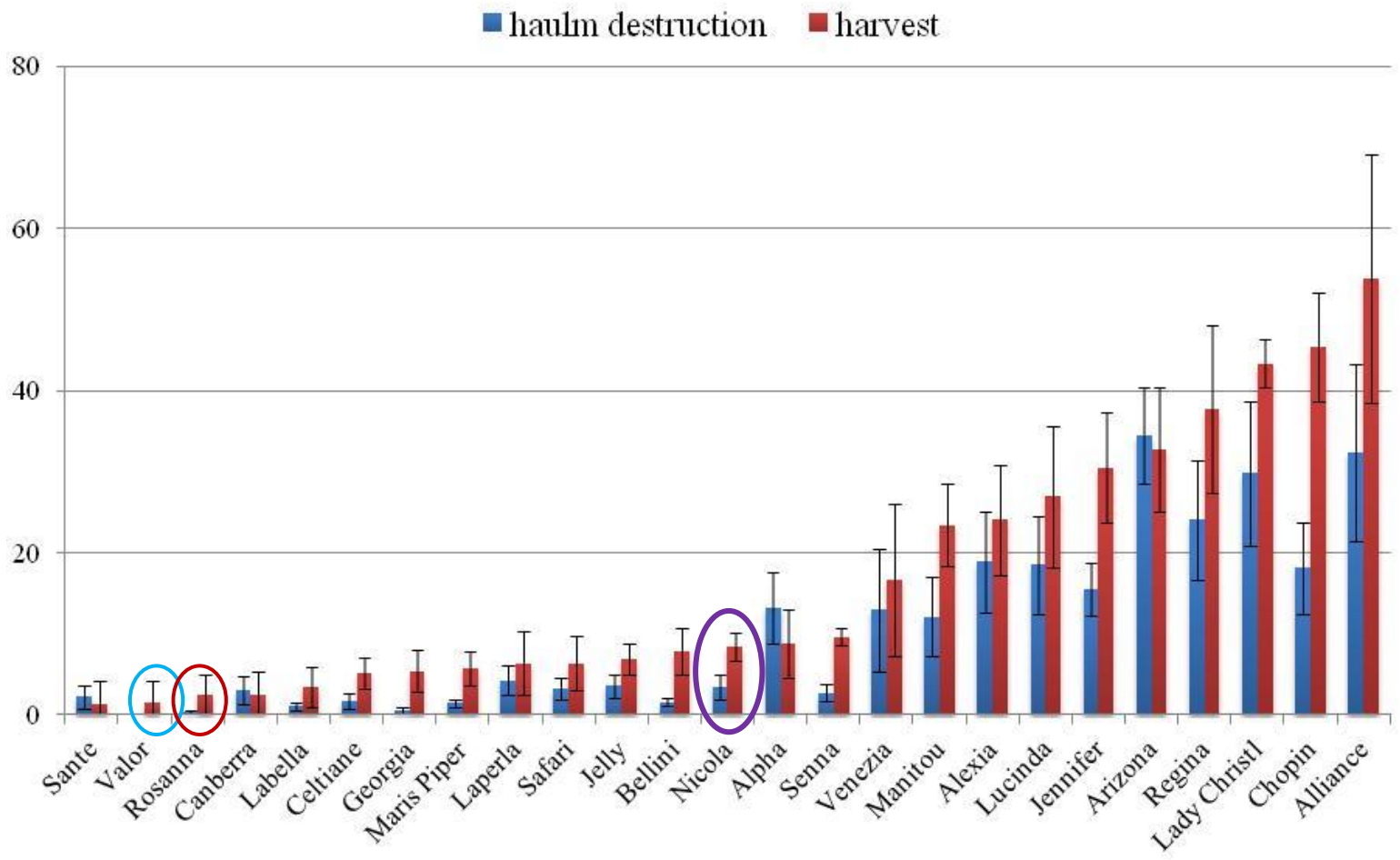
Field trial; sandy soil naturally infested; Winter 2012-13



mid-November planting

Assessment of cultivars to PS incidence

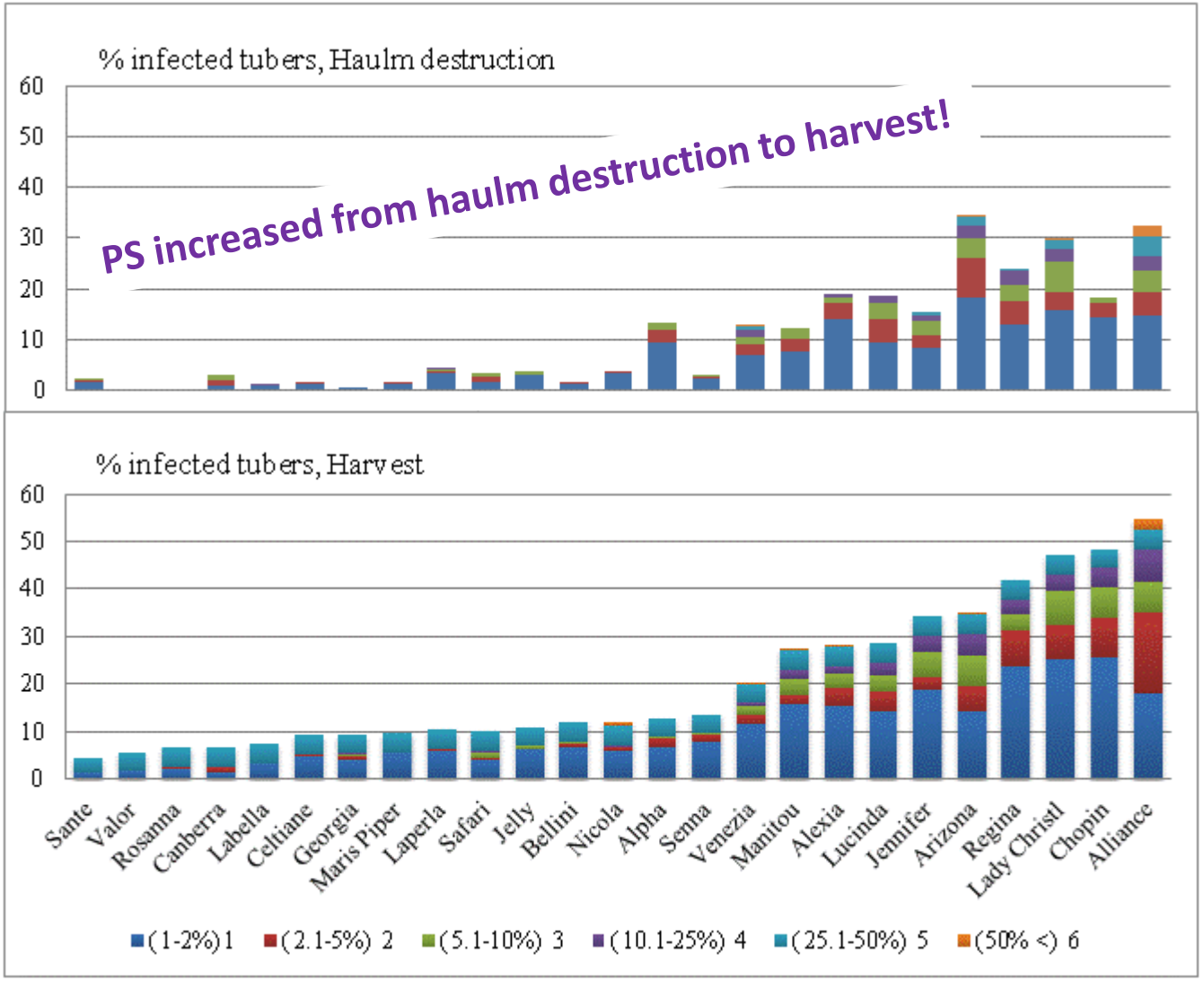
Winter 2013-14



Field trial; naturally infested sandy soil; clean seeds

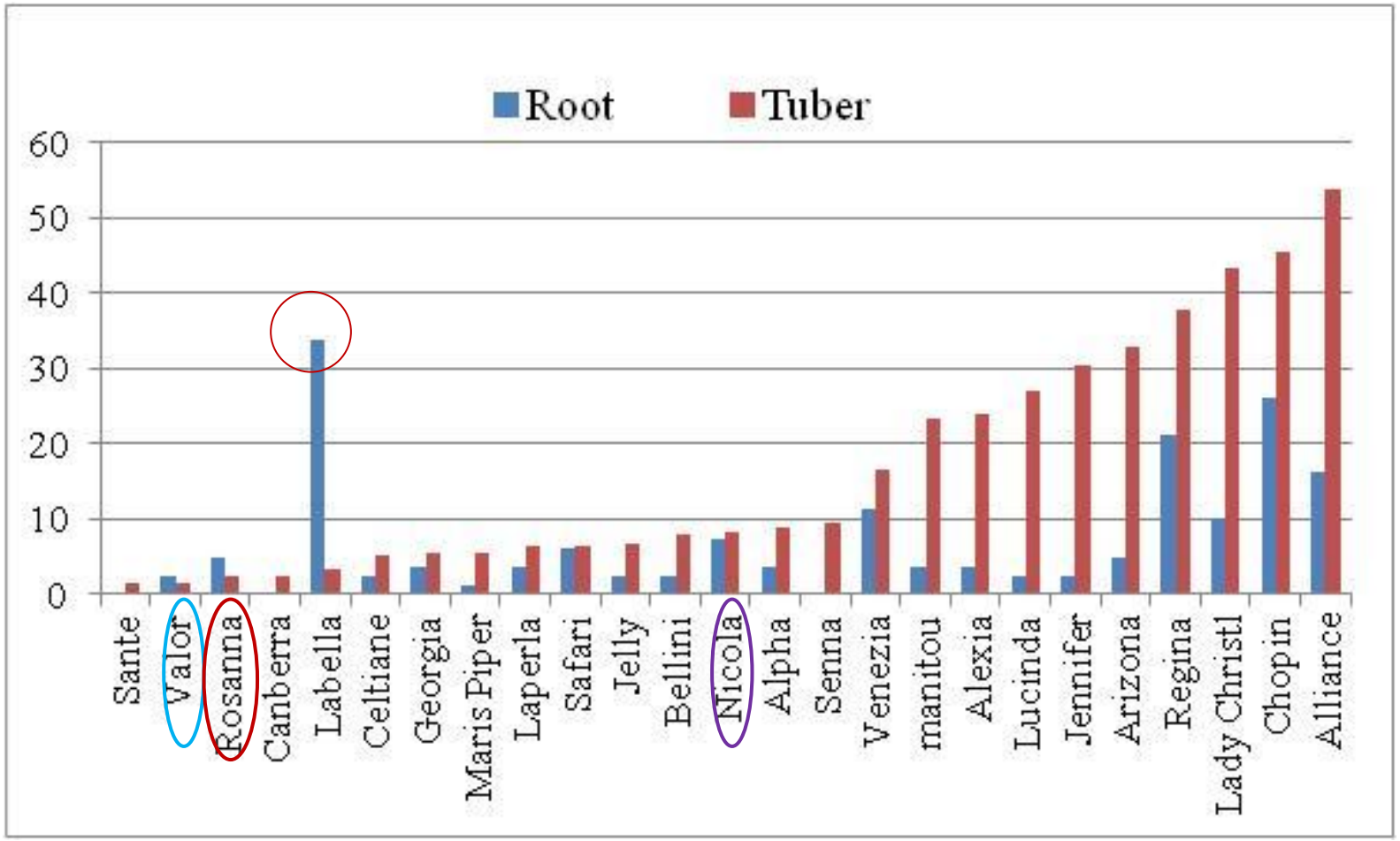
Assessment of cultivars to PS severity

Field trial; sandy soil naturally infested; Winter 2013-14



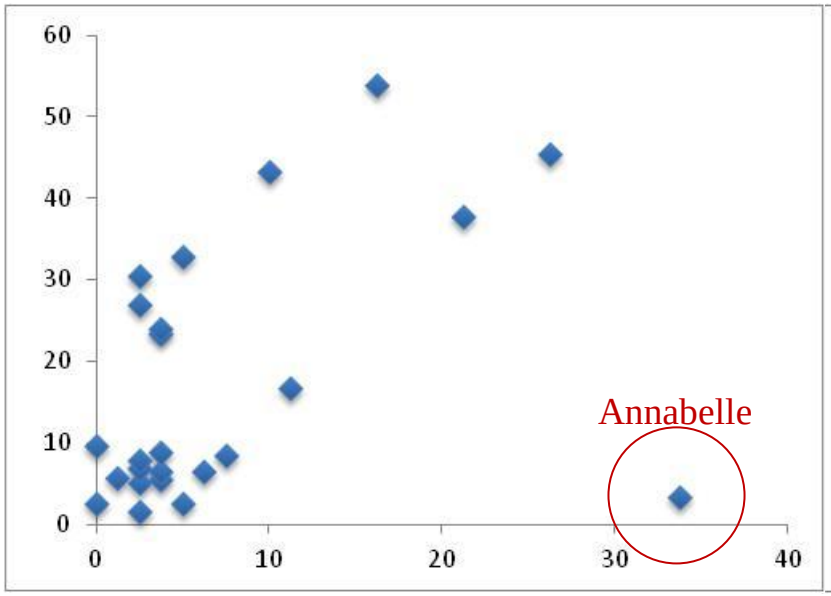
Assessment of cultivars to PS root galls and tuber infection

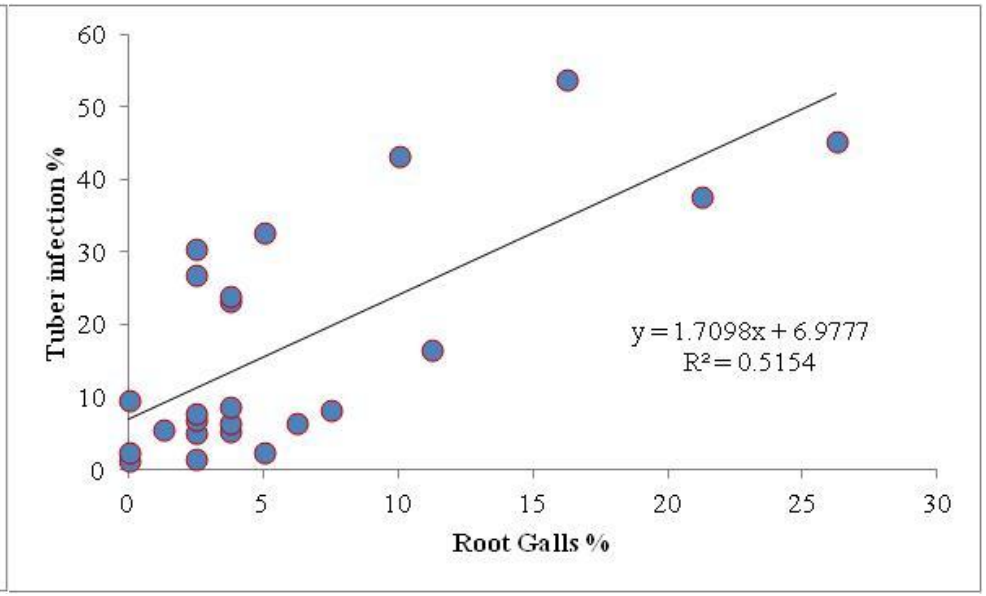
Field trial; sandy soil naturally infested; Winter 2013-14



Correlation between PS root galls and tuber lesions

Field trial; sandy soil naturally infested; Winter 2013-14



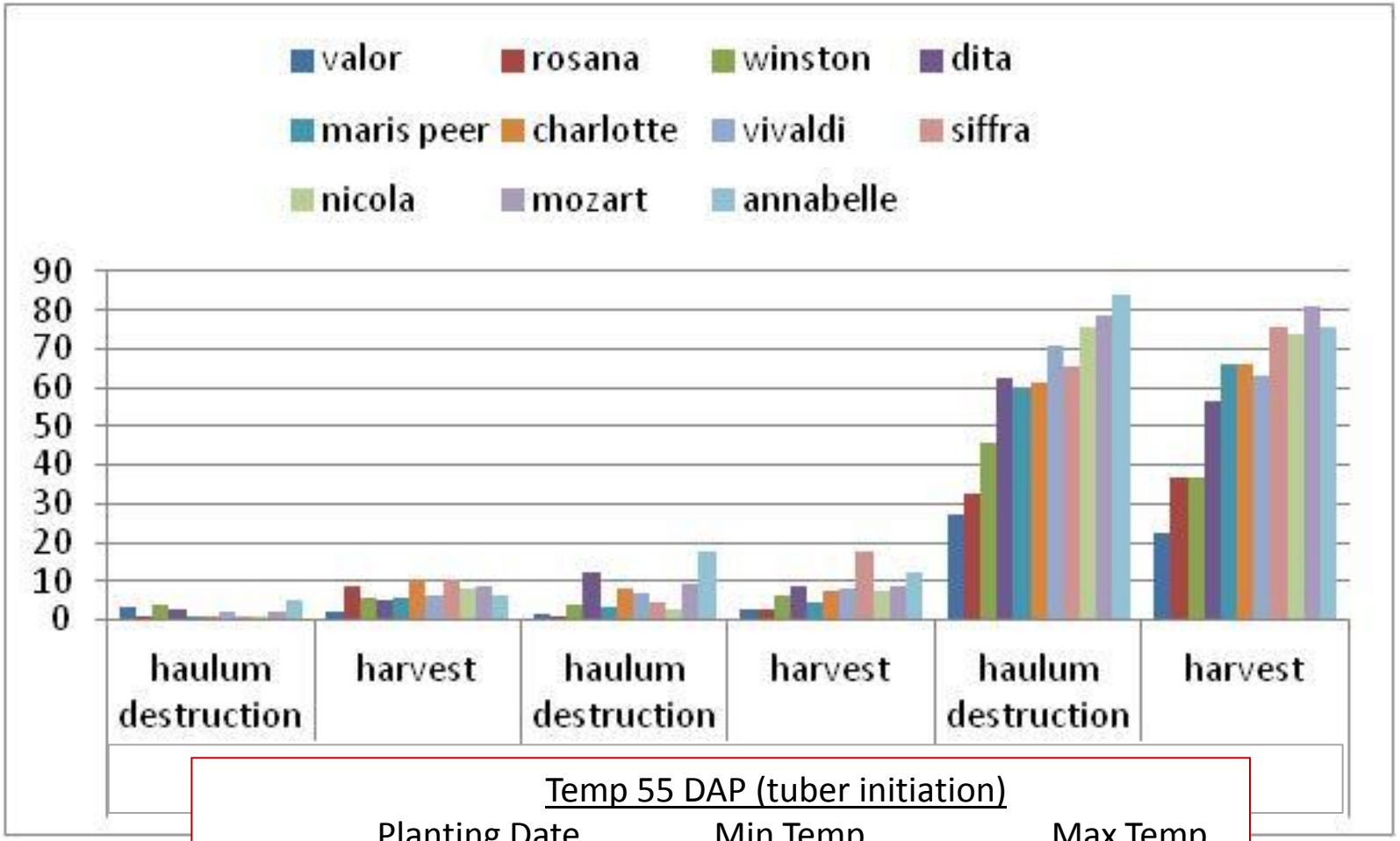


Planting date

Effect of planting date & cultivars on Powdery Scab

Field trial; sandy soil naturally infested; Winter 2013

Avg Max Temp 23°C; Min Temp-11°C

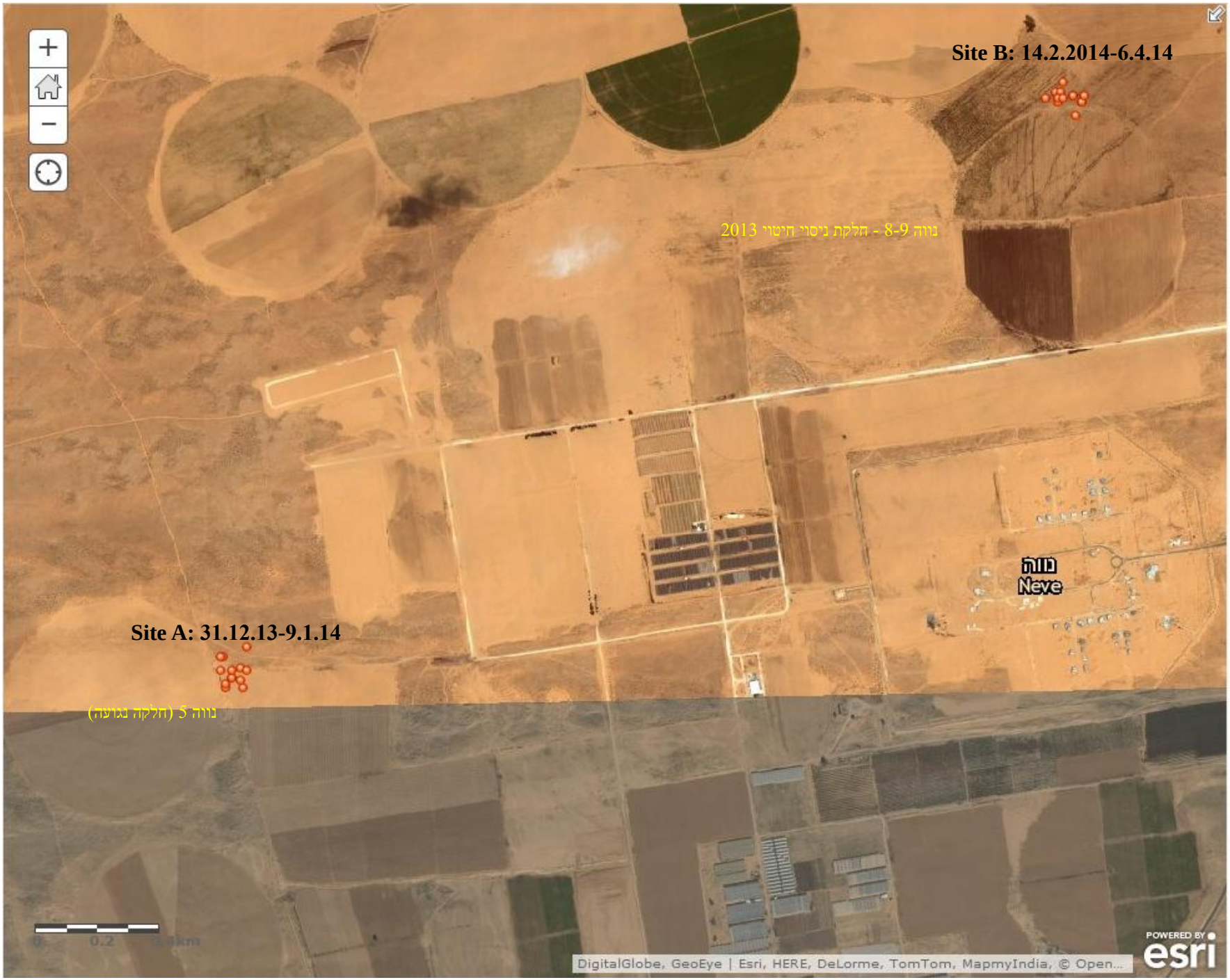


Temp 55 DAP (tuber initiation)

Planting Date	Min Temp	Max Temp
Oct 7	15.1 °C	26.9 °C
Oct 25	13.0 °C	24.0 °C
Nov 15	**10.3 °C**	**20.8 °C**

Dispersal of spore balls by wind?

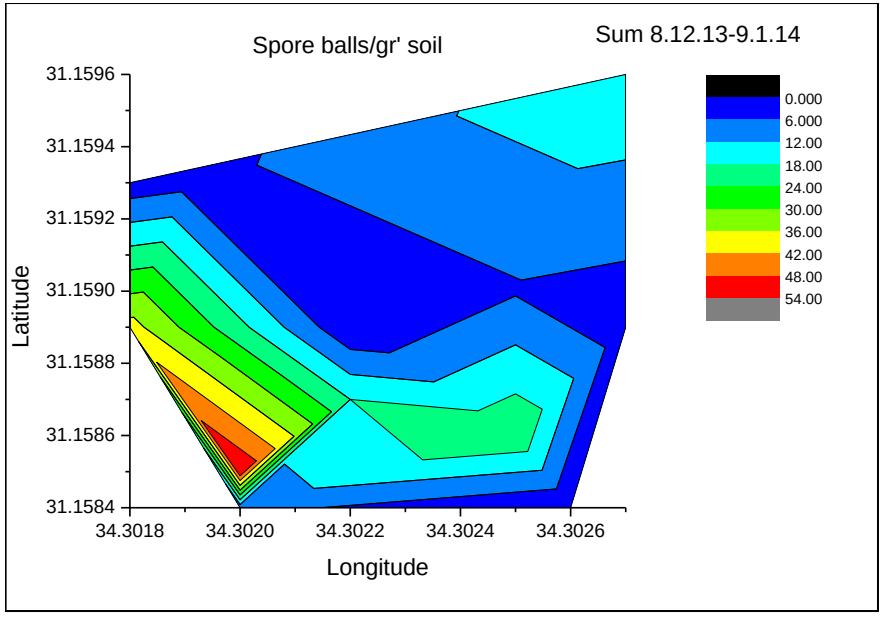
3 days of 70 km/h wind


Site B: 14.2.2014-6.4.14
נווה 9-8 - חלקת ניסוי חיטוי 2013
נווה
Neve
Site A: 31.12.13-9.1.14
נווה 5 (חלקה נגועה)
0
0.2
0.4km
DigitalGlobe, GeoEye | Esri, HERE, DeLorme, TomTom, MapmyIndia, © Open...
POWERED BY
esri

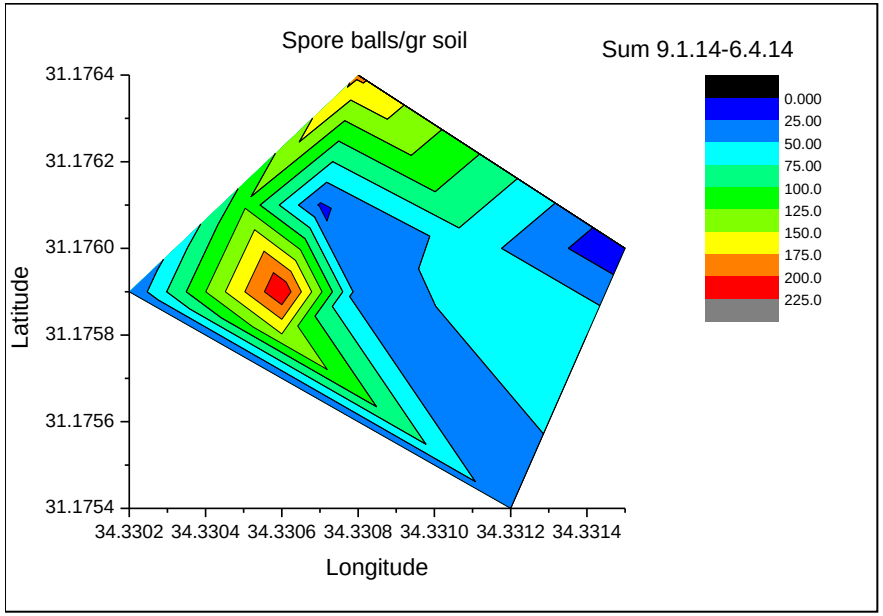
Dispersal by wind

Spatial distribution of PS

site A, 30 m East to infested field



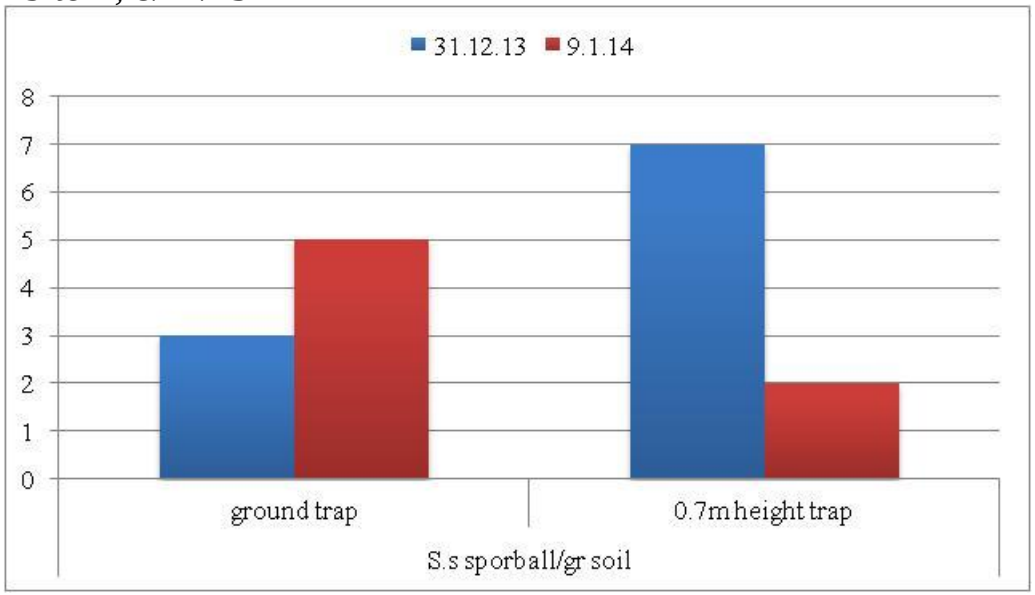
site B, 0.5 km East to infested field



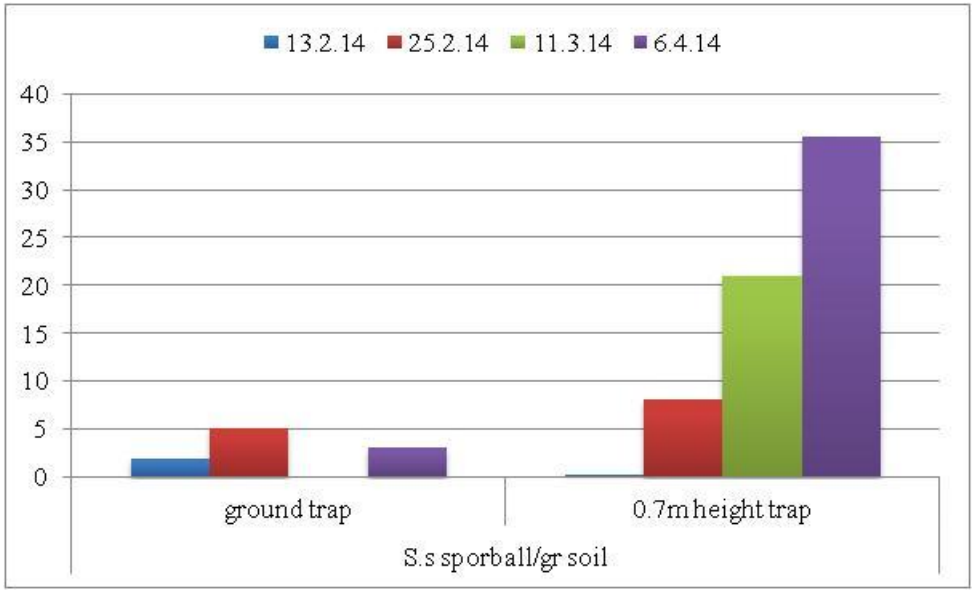
Dispersal by wind

Presence of PS in traps

Site A; 8/12/13



Site B; 9/1/14



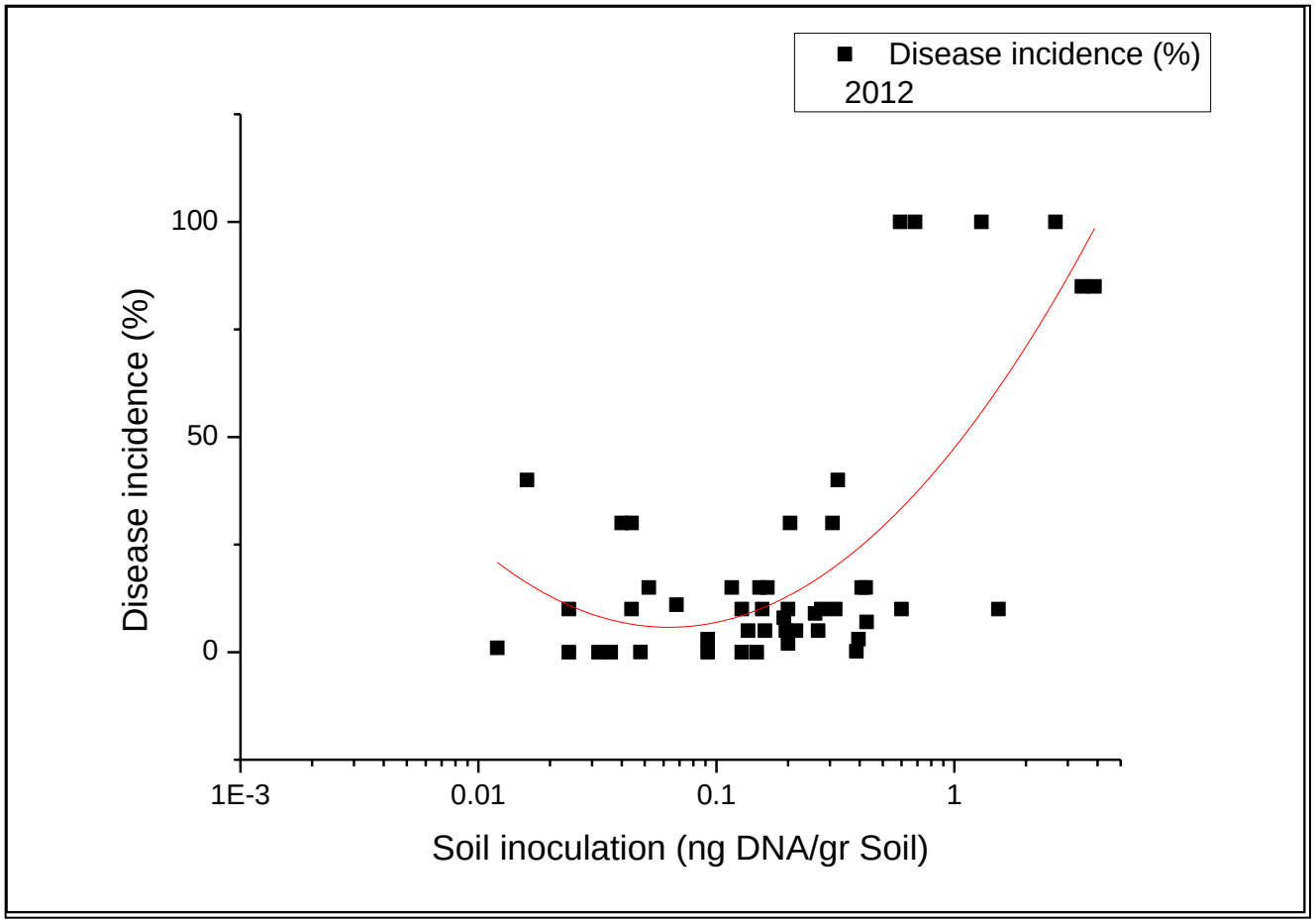
Survey for field PS infestation

Soil samples taken in a W shape; 1 kg/ha (100 points); up to 30 cm depth
200 gr soil – grinding and sieving;
DNA extraction using GeneMATRIX Soil DNA Purification Kit (0.25 grX2)
Analysis 2 rep - TaqMan RT-PCR (Lees et al, 2003)

Soil samples from field trials

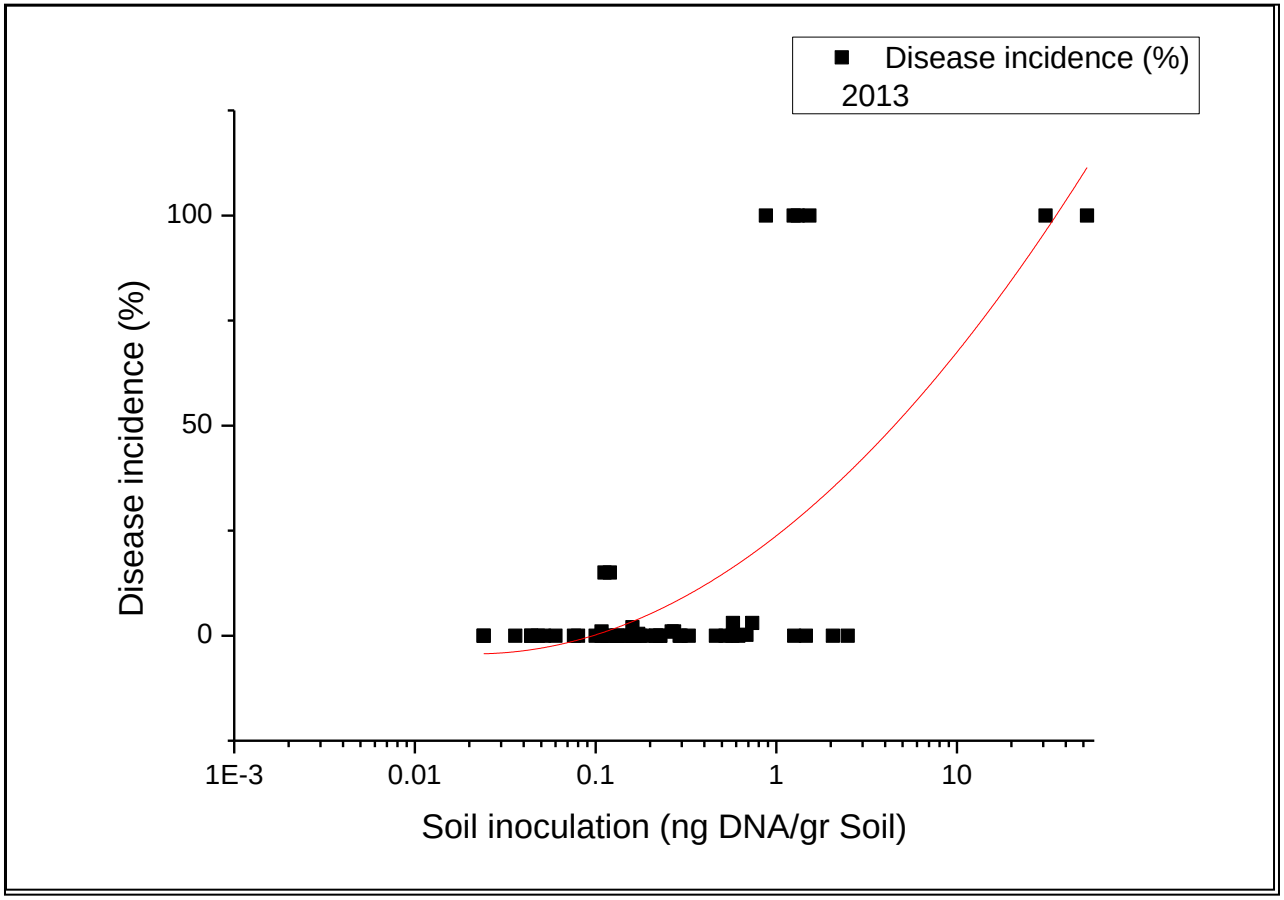
Samples from commercial farms: 50 plots in 2012, 63 in 2013

Survey for field PS infestation



50 plots (commercial farms); Pearson's r =0.50657

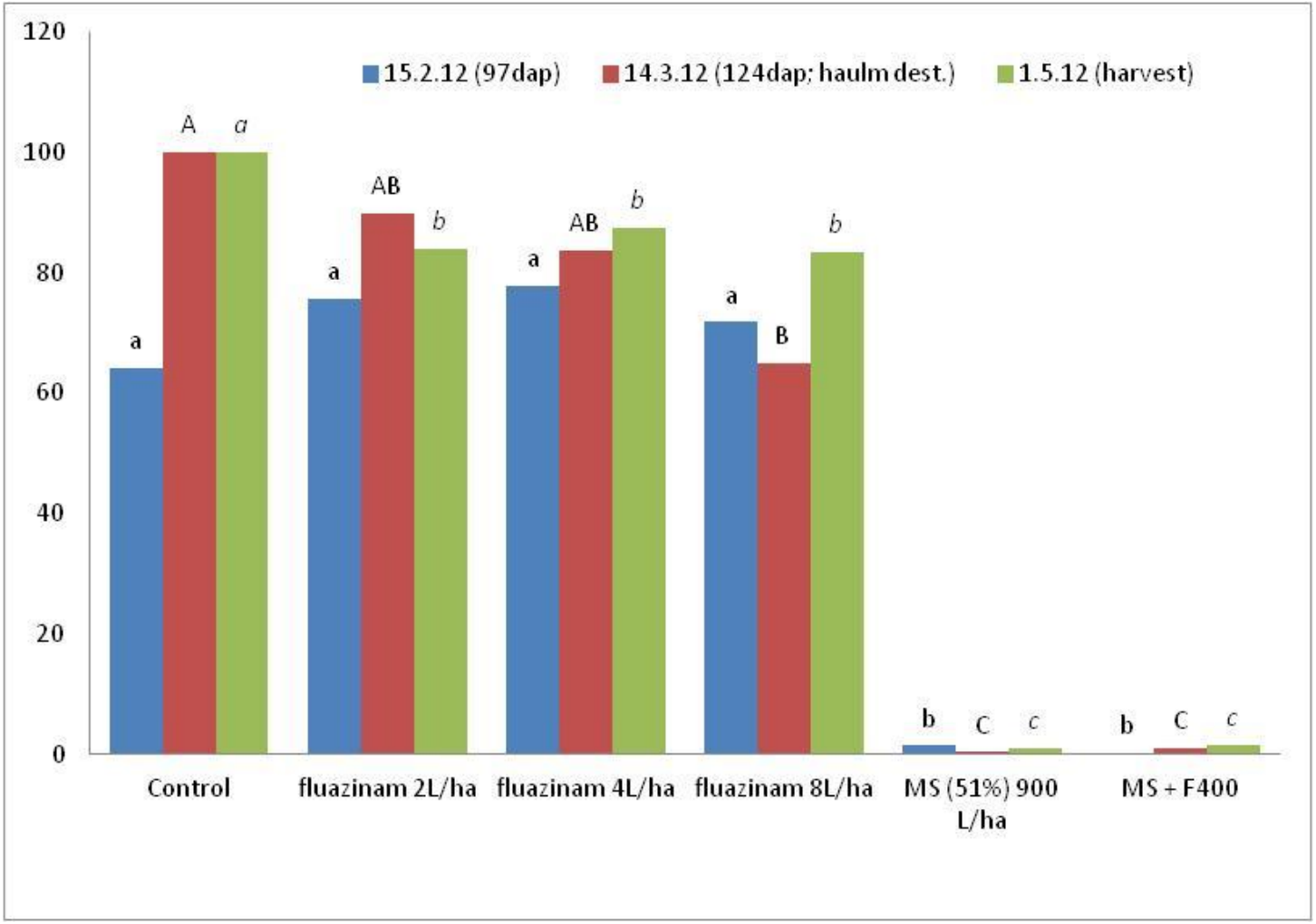
Survey for field PS infestation



63 plots; Pearson's r =0.43339

Effect of soil treatments on PS incidence

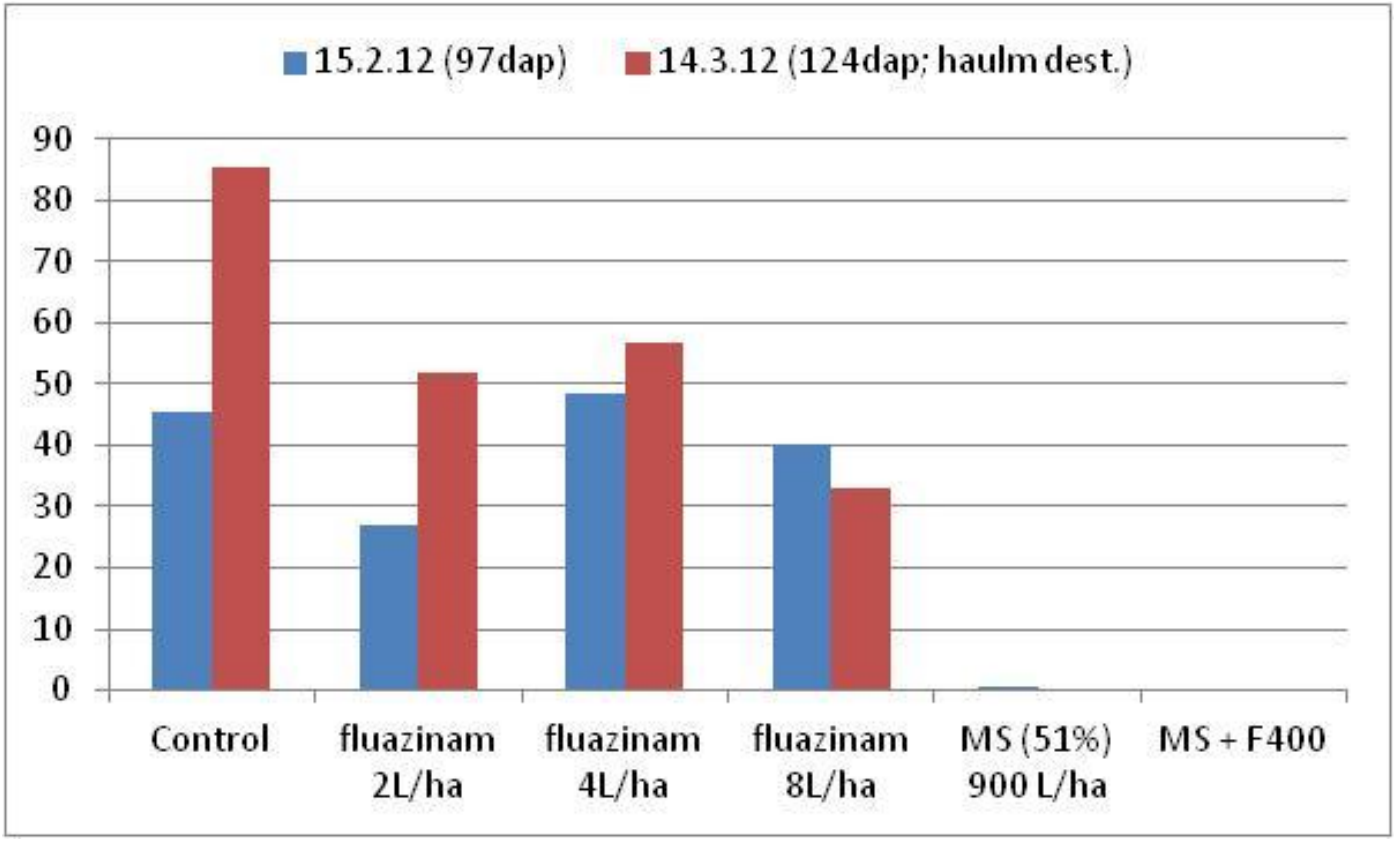
Winter 2011-12



Field trial; naturally infested sandy soil; cv. Exquisa

Effect of soil treatments on root galls

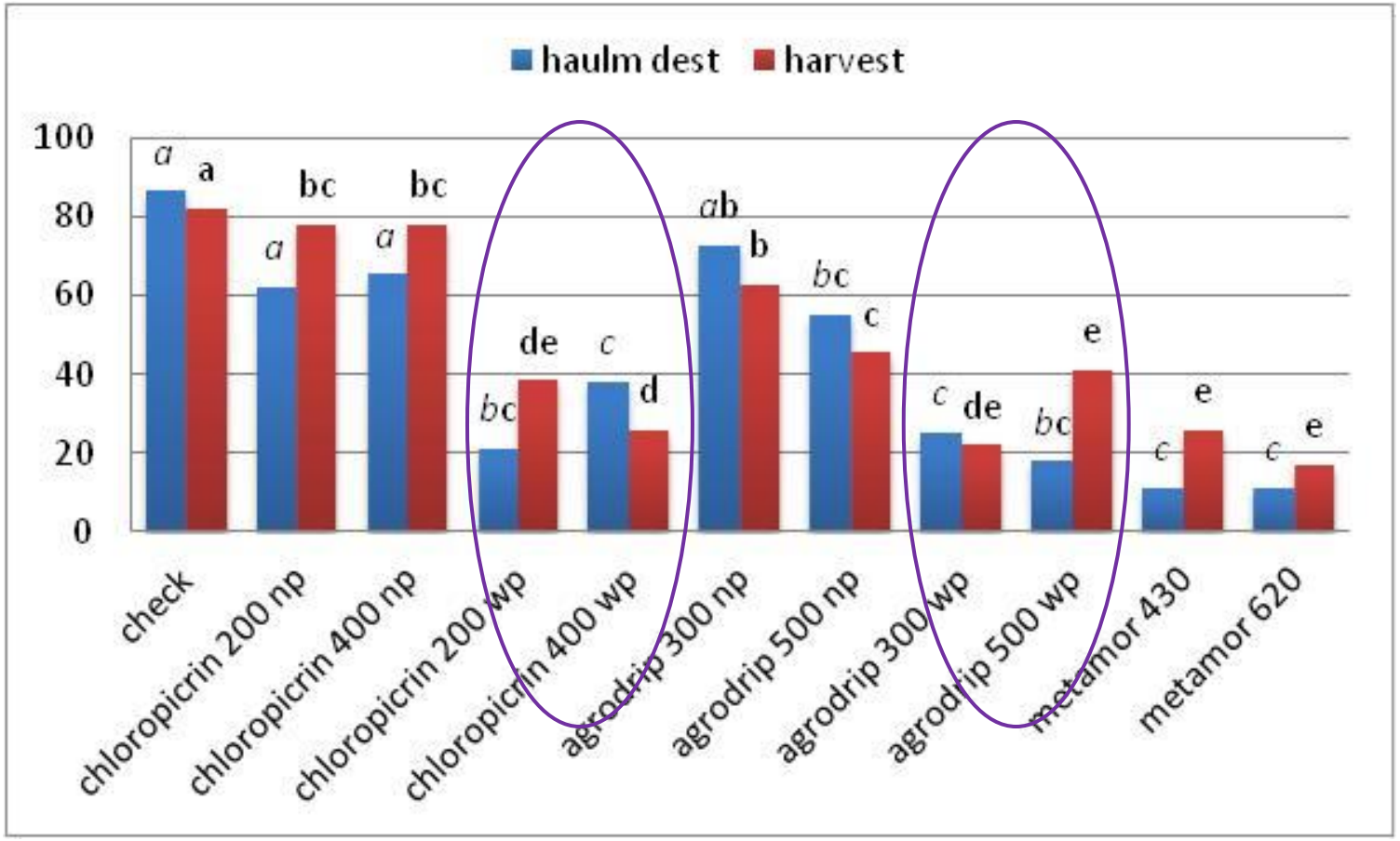
Winter 2011-12



Field trial; naturally infested sandy soil ; cv. Exquisa

Effect of soil fumigation on PS incidence

Winter 2012-13; [with/no plastic]



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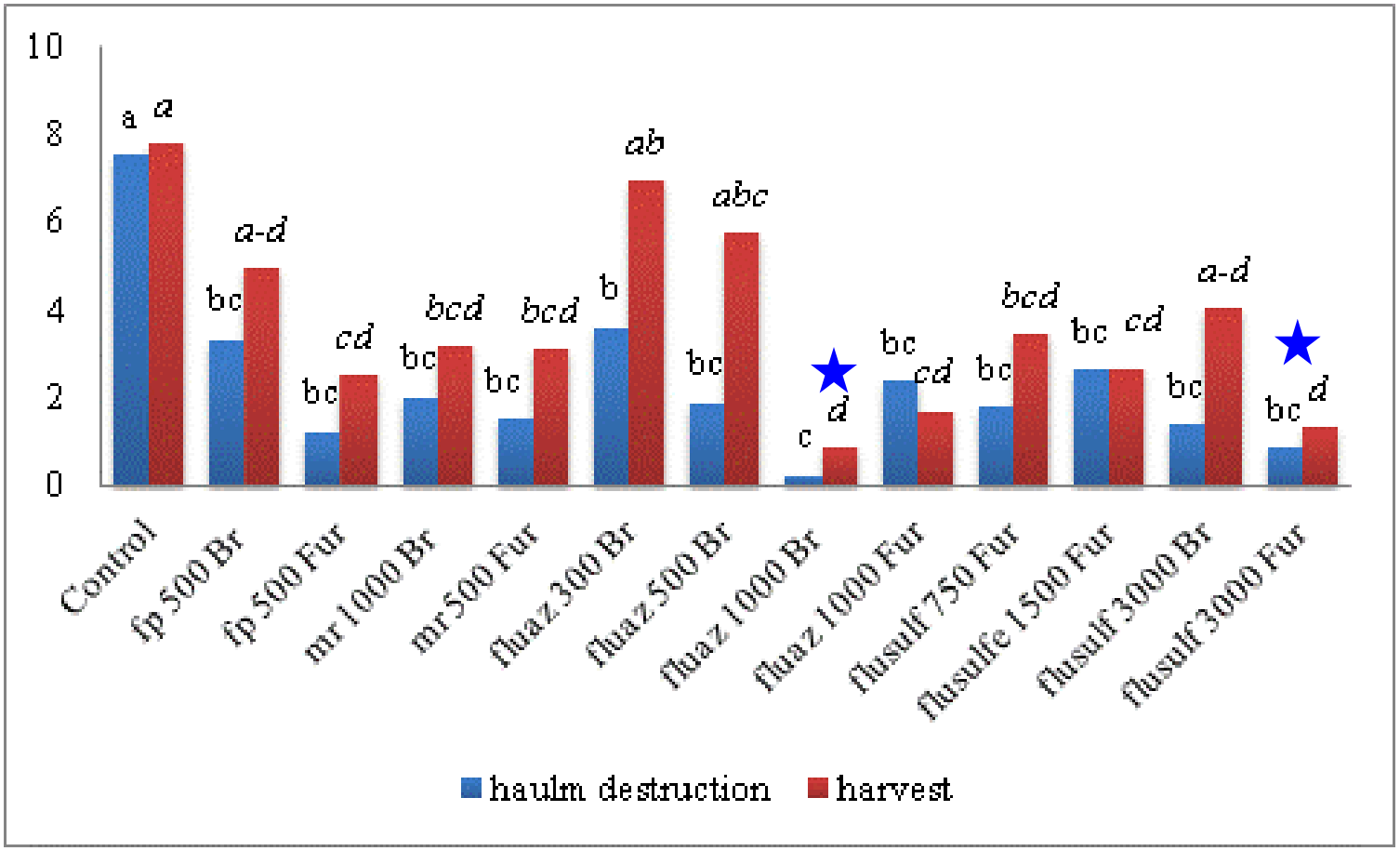
Effect of soil treatments on PS incidence

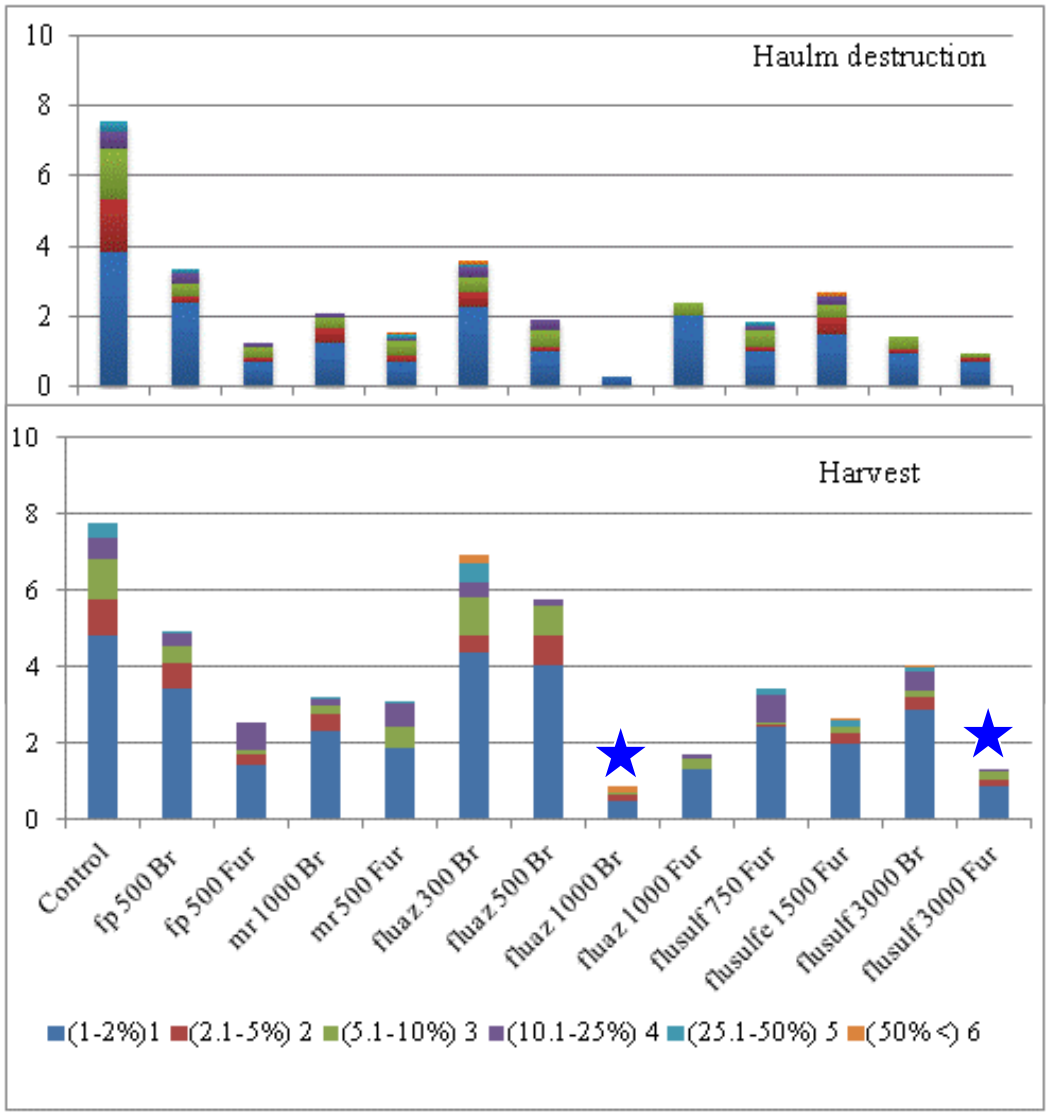
Winter 2013-14



Field trial; naturally infested sandy soil; cv. Maris peer

Effect of soil treatments on PS incidence

Winter 2013-14



Field trial; naturally infested sandy soil; cv. Maris peer

SUMMARY

- The disease is prevalent in the Negev desert in Israel
- Major inoculum source: contaminated imported seeds
- Latent infection of tubers occurs
- PS dispersal by wind
- PS incidence may increase after haulm destruction
- A wide range of susceptible/tolerant cultivars
- Soil fumigation with metam sodium/chloropicrin is effective
- Soil and seed treatments should be further investigated
- Using disease free seeds prevents yield damage in the short term and field infestation in the long term

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Gilan Maharshak - Ego Enterprises

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