

Latest Developments on Alternative Hosts

Comparative Susceptibilities of Kudzu
Accessions to *Phakopsora pachyrhizi*

By

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“.. an analysis of the threat of rust to soybeans in the United States must await the results of other studies involving the potential host range and pathogen survival.”

J.S. Melching, K.R. Bromfield, C.H. Kingsolver
1979

Objective: Determine susceptibility of various legumes to soybean rust under greenhouse conditions

A. winter legumes

B. legume crops other than soybean

Procedure

- Inoculate plants at about one month of age.
- Examine 2 weeks after inoculation.
- Record reaction type (Tan or RB).
- Rate lesion density and percent of lesions sporulating.
- Collect leaf tissue, fix, clear and stain.
- Determine average number of uredinia per lesion and average unuredinia diameter.

Reaction Types



Tan



RB



Mixed

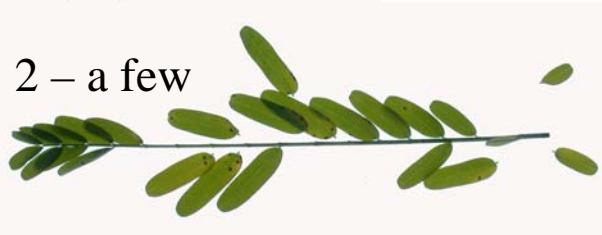
Lesion Density - Compare heaviest lesion density on plant to soybean control and rate from 1 to 5.



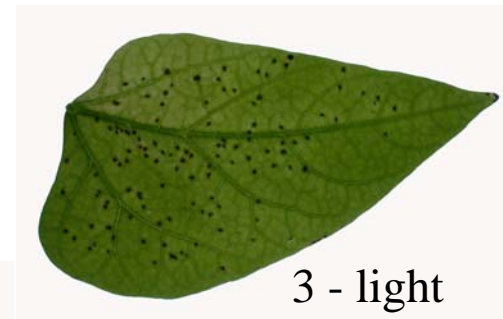
Soybean control



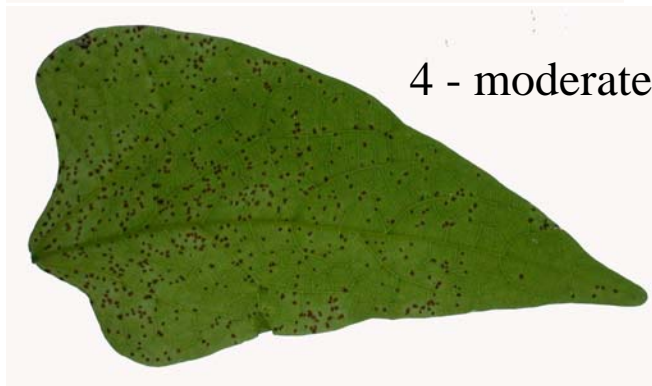
1 - none



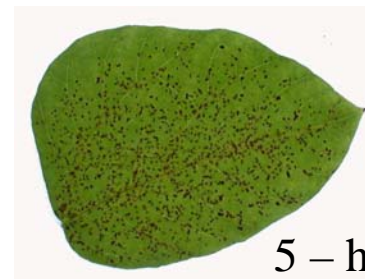
2 - a few



3 - light



4 - moderate



5 - heavy

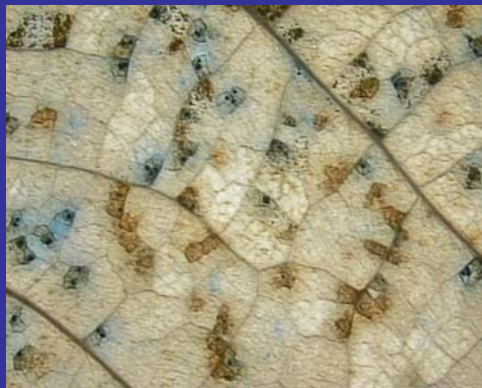
Percent sporulation — Estimate the percent of lesions that are sporulating and assign number.

- 0 – none
- 1 – 20%
- 2 – 40%
- 3 – 60%
- 4 – 80%
- 5 – 100%



Spore producing area per lesion –

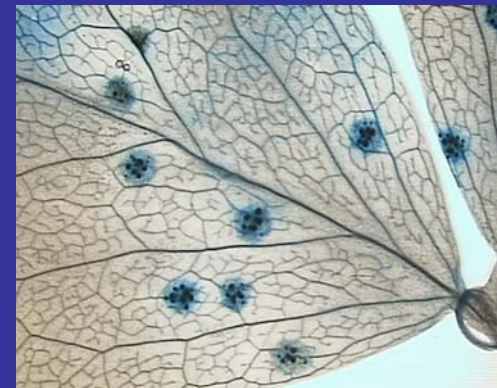
Calculate from average number of uredinia per lesion and average uredinia diameter on stained leaves.



3,700 μm^2



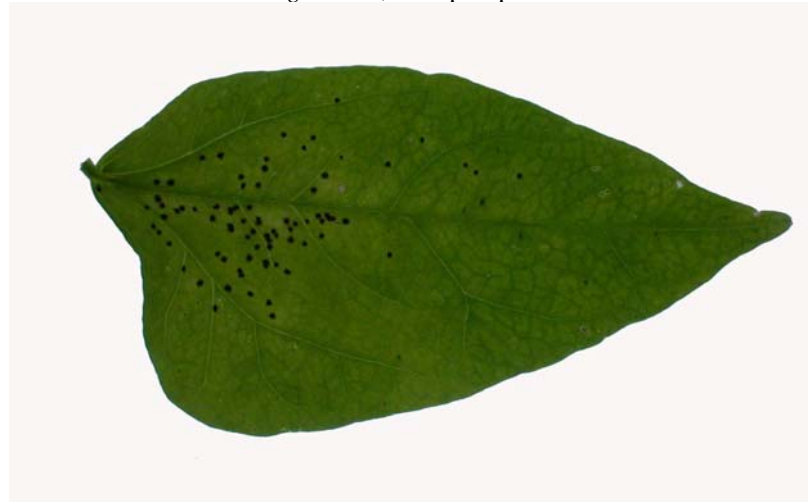
33,500 μm^2



58,600 μm^2

COWPEA

Vigna Savi, multiple species



Bottom



7X

Top



7X



25X



25X

GREEN BEAN, HIGH SPORULATING

Phaseolus vulgaris L.



Bottom

Top



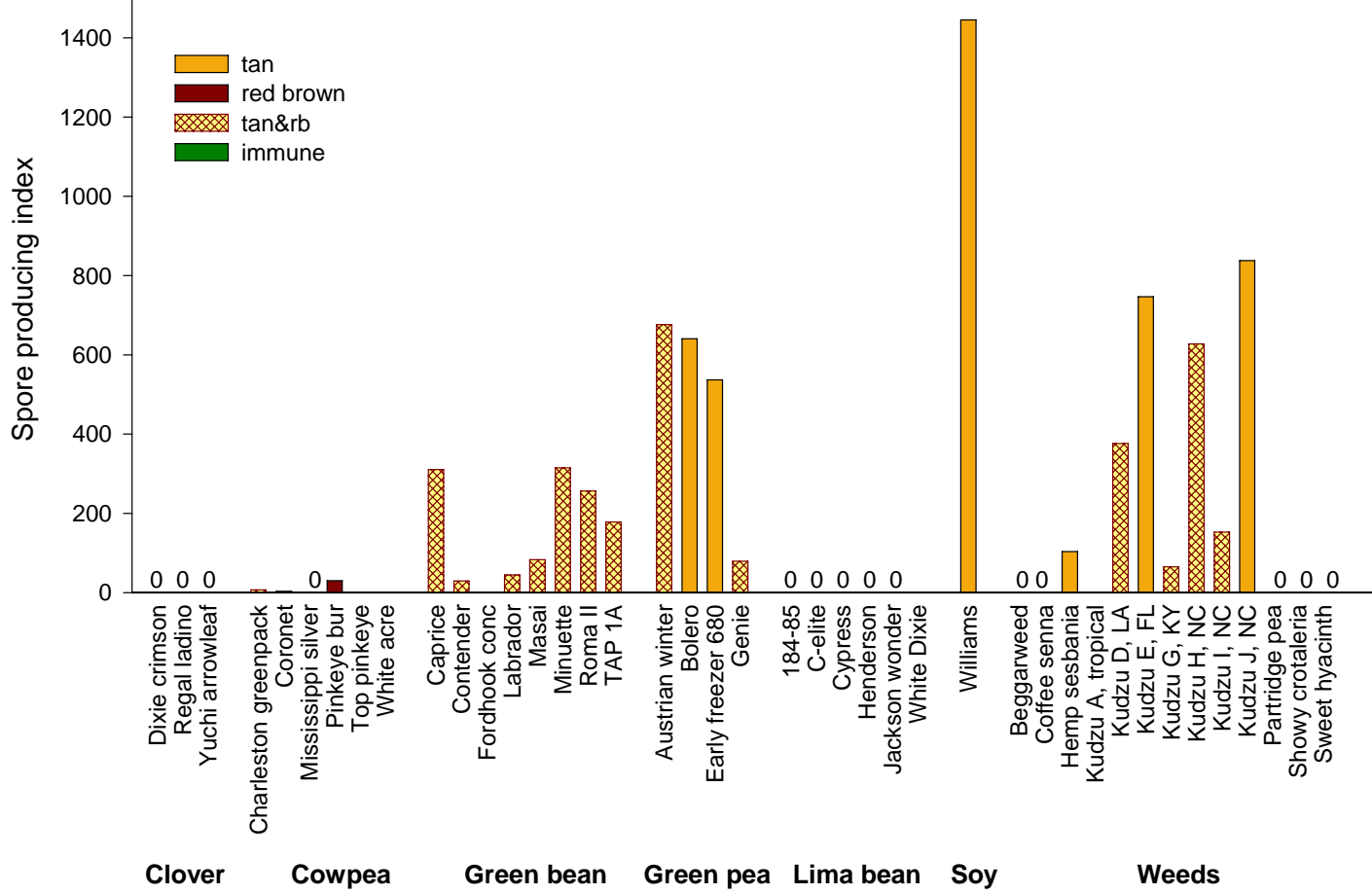
7X

7X



25X

25X



Conclusions

- Clovers – not very important
- Cow pea – susceptible but does not sporulate well
- Green beans – some fairly susceptible
- Green peas - very susceptible but leaves fall rapidly
- Lima beans – susceptible but does not sporulate
- Kudzu – susceptible with high sporulation in general

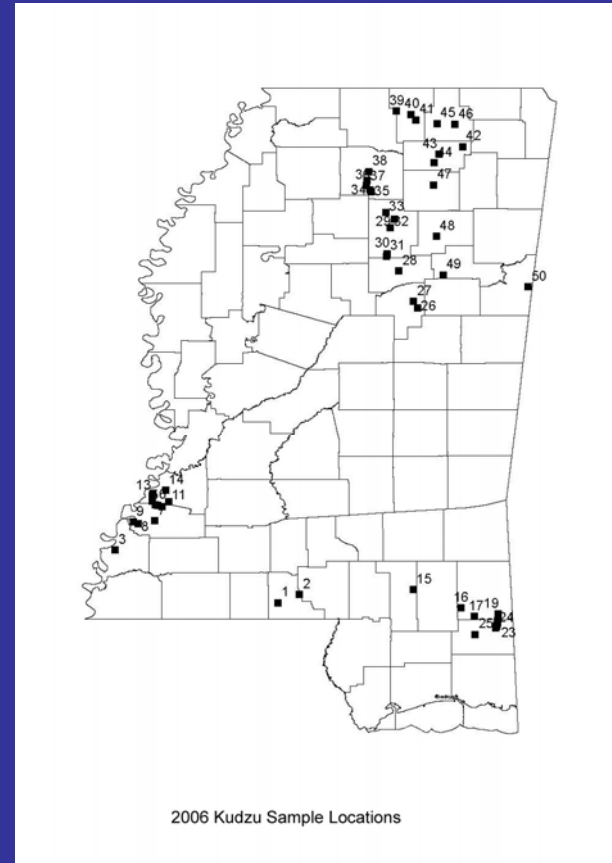
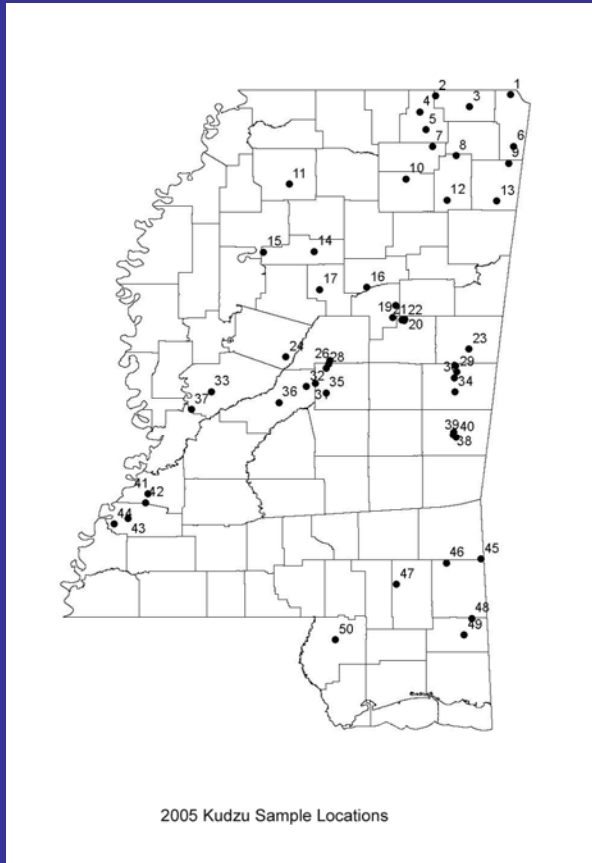
Experimental Design

- Used three isolates of *P. pachyrhizi*, one each from Brazil, Alabama, and Louisiana.
- Inoculated 85 plants from 40 locations.
- On each plant, each of three trifoliolate leaves inoculated with one isolate.
- Examined plants 14 days after inoculation.
- Repeated study.

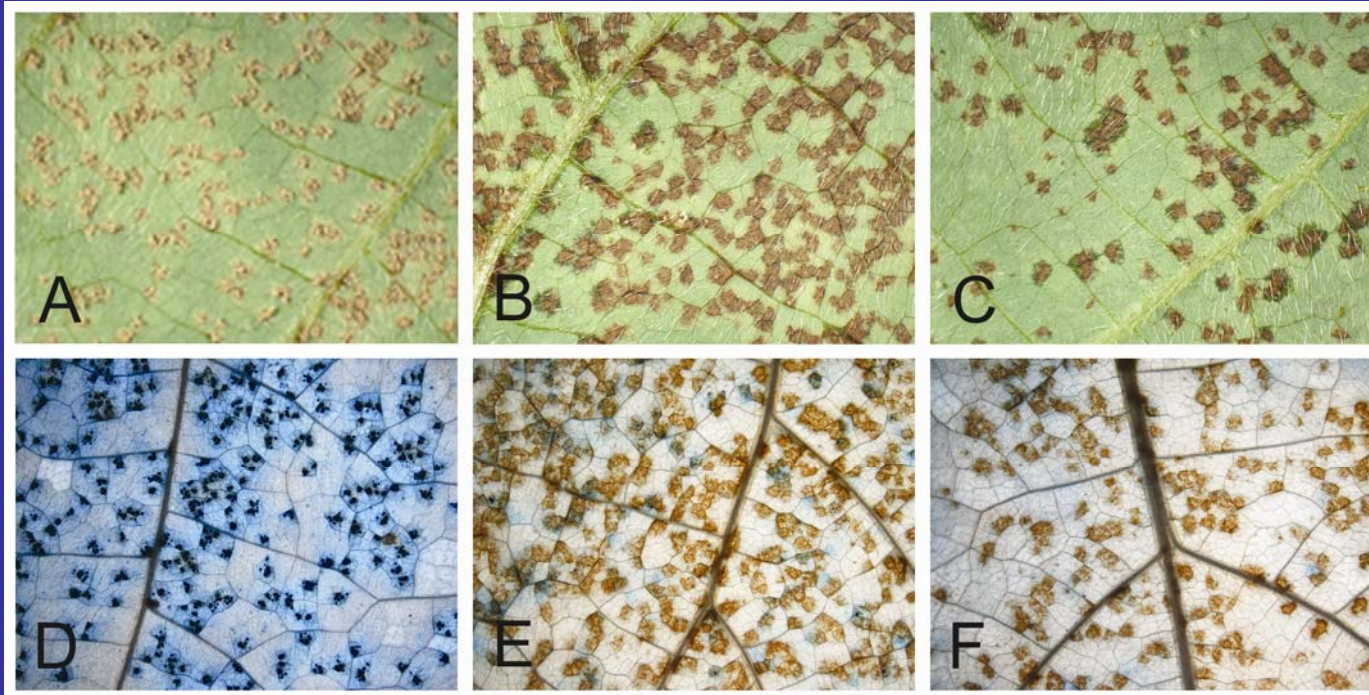
Reaction Type/Measurements on Kudzu

- Lesion type (Tan, RB or Immune)
- Average lesion density rating (1-5)
- Average sporulation rating (0-5)
- Average number of uredinia per lesion
- Average diameters of uredinia

MS Kudzu Seed Collections



Reaction Types on Kudzu



Ave. Lesion Density Ratings (1-5 scale)

	BZ01-1		AL04-1		LA04-1	
	<u>Tan</u>	<u>RB</u>	<u>Tan</u>	<u>RB</u>	<u>Tan</u>	<u>RB</u>
Experiment 1	4.3	3.5	4.1	3.3	4.2	3.4
Experiment 2	4.9	4.1	4.8	3.8	4.7	3.9

Ave. Sporulation Ratings (0-5 scale)

	BZ01-1		AL04-1		LA04-1	
	<u>Tan</u>	<u>RB</u>	<u>Tan</u>	<u>RB</u>	<u>Tan</u>	<u>RB</u>
Experiment 1	4.9	1.1	5.0	1.1	4.9	0.7
Experiment 2	4.8	0.6	5.0	0.8	4.9	0.9

Ave. Number Uredinia per Lesion and Ave. Uredinia Diameters

Plant/Reaction Type	Ave. Number Uredinia/Lesion	Ave. Uredinia Diam. (μm)
Kudzu Tan	3.3	122
Kudzu RB	0.2	75
Soybean Tan	4.7	129

Summary of Results

- Of 85 inoculated plants, only six had a different reaction for one isolate.
- Of the other plants, 38 produced all Tan reactions, and 39 all RB reactions.
- All plants from 19 of 25 specific sites produced the same reaction type.

Conclusions

- Kudzu spreads mostly by vegetative growth.
- Suggests some locations of southeastern U.S. might have much rust on kudzu, others little.
- Kudzu may be important in survival and spread of soybean rust.