



## **U.S. PVP use of disease reaction characteristics in soybean DUS examination**

### **U.S. PVP examination process**

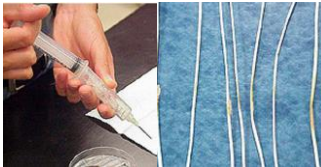
- Breeders may evaluate a variety for its reactions to commercially important diseases found in its area of adaptation
- The PVP application allows Breeders to describe a variety's reactions to diseases that have been evaluated
- US PVPO utilizes the disease reaction data as part of the DUS determination

## Common soybean diseases assessed

- Phytophthora Root Rot (*Phytophthora sojae*)
- Stem Canker (*Diaporthe phaseolorum*)
- Pod and Stem Blight (*Diaporthe phaseolorum*)
- Frog Eye Leaf spot (*Cercospora sojina*)
- Sudden Death Syndrome (*Fusarium virguliforme*)

## Breeder Disease Testing Inoculation Methods

Injection



Dorrance et al., 2004. PHP doi:10.1094/PHP-2004-0309-01-RS.



Broadcasting



Blasting

Spraying



US PVP - Soybean - Disease resistance

## Breeder Disease Testing

### Phytophthora Root Rot

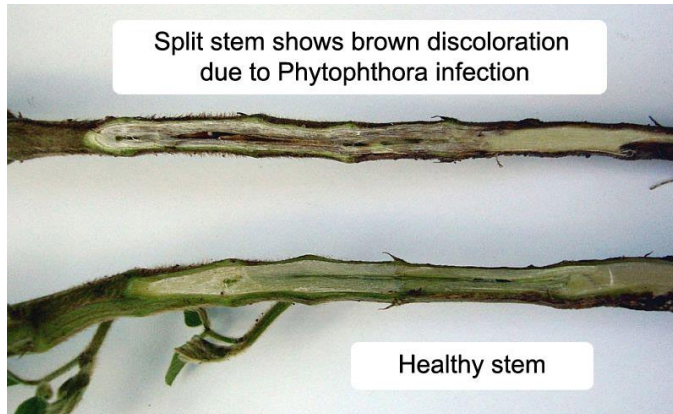


Susceptible

Resistant

## Breeder Disease Testing

### Phytophthora Root Rot – stem symptoms



Susceptible

Resistant

## Breeder Disease Testing

### Frog Eye Leaf spot

Disease reaction rating



Susceptible



Tolerant



Resistant

## Breeder Disease Testing

### Sudden Death Syndrome

Susceptible vs. Tolerant



Susceptible vs. Tolerant



## Disease reaction report

### U.S. PVP Exhibit C form (partial)

**DISEASE REACTIONS SCORING** 0=Not Tested 1=Susceptible 2=Resistant 3=Tolerant

#### Bacterial

0 Bacterial Pustule

0 Bacterial Blight

#### Fungal

Phytophthora Root Rot – (Races 1-45) 2 race 3 1 race 4

Gene(s) coding for Phytophthora Root Rot: 2 Rps1c 1 Rps1k (1=Absent 2=Present)

2 Stem Canker

0 Brown Spot

Frogeye Leaf Spot– (Races 1-7) 3 race 2 3 race 5

0 Sudden Death Syndrome

#### Viral

## PVP Examiner – Disease Analysis

- Disease reaction ratings are used in combination with other phenotypic traits to distinguish varieties
- PVP Examiners conduct a database search using morphology and disease reaction parameters to distinguish a new variety from 2,700+ other soybean varieties

### Example Soybean Disease Trait - Database Search

Number of Occurrences	Search Parameter
1524	SEED COLOR YELLOW
100	COTYLEDON COLOR YELLOW
18	POD COLOR BROWN
9	PHYTOPHTHORA RACE 4 SUSCEPTIBLE
7	PHYTOPHTHORA RACE 3 RESISTANT
6	STEM CANKER RESISTANT
2	FROG EYE SPOT RACE 2 TOLERANT
1	FROG EYE SPOT RACE 5 TOLERANT

### Summary

- Breeders conduct disease resistance testing during soybean variety development
- Breeders provide evidence of disease resistance/tolerance/susceptibility as part of their PVP application
- PVP examiners evaluate this information in the course of DUS examination