

## SEED TRANSMISSION OF THE WEB BLIGHT PATHOGEN *Thanatephorus cucumeris*, IN DRY BEANS IN THE DOMINICAN REPUBLIC.

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### INTRODUCTION

Web blight of dry beans (*Phaseolus vulgaris* L.), caused by *Thanatephorus cucumeris* (Frank) Donk, (anamorph *Rhizoctonia solani* Kuhn), is a yield-limiting disease in Central America and the Caribbean. In the Dominican Republic (DR), web blight (WB) is endemic in bean growing regions where yield losses in commercial fields can be 60-80% (BIC 35:90-91). The pathogen affects not only yield but also seed quality. Blemishing of white and colored seeds have ranged from 12-62%, respectively in bean plots infested with the AG-1-IB, microsclerotia type of *T. cucumeris*, and 1-19% in plots with type AG-2-2 (Unpublished data).

Most information on seedborne *Rhizoctonia* refers to soil isolates (presumably AG-4) causing root rot or seedling blights (4) and little is known about bean seed infection by the WB pathogen (2).

Objectives of this study were: to determine the extent of association of the WB pathogen and seed blemishing and the effect of the WB pathogen on seed germination as well as seedling survival and development.

### MATERIALS AND METHODS

Seeds were collected from infected plants (blighted foliage  $\geq$  40%) of six white, black and red mottled bean varieties/lines grown in plots in the San Juan Valley (400 masl) where the predominant WB pathogen is the AG-1-IB microsclerotia type. The presence of the WB-pathogen on seeds was determined by placing 1800 seeds, representing all varieties, on petri plates containing 2% water agar amended with 30  $\mu$ L of metalaxyl (Ridomyl 2E, 25% a.i.) and 60  $\mu$ L of Streptomycin sulphate (1 g/ml dist. water). The plates containing the seeds were incubated at 25-28°C for 48 hr after which *T. cucumeris* colonies were counted and transferred to Difco Potato Dextrose Agar (PDA) for AG-typing (3). Pathogenicity of *T. cucumeris* seed isolates was assessed on 10-day-old bean plants cv. PC-50 grown, as previously published (BIC 35:90-91). The effect of *T. cucumeris* on seed germination and seedling survival and development (expressed as seedling height and top and root weight) was determined in the greenhouse.

### RESULTS AND DISCUSSION

A highly significant association ( $\chi^2 = 625^{**}$ ) was detected between seed coat blemishes and the presence of *T. cucumeris* AG-1-IB. Seeds of white as well as black and red mottled lines/varieties infected by the pathogen caused either unusual pigmentation and/or discolorization of seeds (Table 1). Low levels of the WB pathogen also were detected in apparently healthy seeds obtained from infected plants (Figure 1). The presence of the WB pathogen in clean seeds may have epidemiological implications in the spread of the pathogen from one region to another. In contrast with the results obtained with *Rhizoctonia* root rot and seedling blight isolates (1, 5, 6) black seeds had higher levels of seed infection than red mottled and white seeded varieties. All of the *T. cucumeris* AG-1-IB isolates obtained from the six lines/varieties were pathogenic on PC-50 bean plants. Significant differences ( $P = 0.05$ ) were observed in percentage of germination and seedling survival as well as seedling height and top weight both between blemished and unblemished and control seeds in white and black seeded lines/varieties. Our results, in contrast, show that seedling emergence was always above 80%, even when the WB pathogen was shown to be seedborne. This would indicate that *R. solani* soil isolates are more active in seed/seedling decay while the aerial isolates causes more damage to adult bean plants.

Resistance to *Rhizoctonia* seed infection in *P. vulgaris* has been attributed to seed coat color with Prasad and Weigle (5) suggesting that black seed coats may restrict pathogen entry because they adhere more tightly to the cotyledon and tend to crack less than white or lighter seed coats. The

results from this and a previous investigation showed that *T. cucumeris* AG-1-IB causes seed blemishing and reduces seed germination and seedling development in lines/varieties with white, black and red mottled seeds. Other factors, independent of seed coat color, may be involved in tolerance of *P. vulgaris* to the WB pathogen. Characteristics of plant architecture, such as branching, pod distribution in the canopy or leaf size and architecture that prevent spread of the pathogen to developing pods should be considered in breeding for improved WB resistance.

### CONCLUSIONS

1. The AG-1-IB microslerotia type of *T. cucumeris* caused seed blemishing and/ or discoloring and directly reduced seed quality.
2. The WB pathogen is transmitted in white and colored seeds.
3. Contrary to earlier reports, black seeded beans showed higher susceptibility to seed infection. Differences are likely due to the different AG types involved in each study.
4. AG-1-IB type of *T. cucumeris* affected germination and seedling development although to levels below that of other *R. solani* AG types.

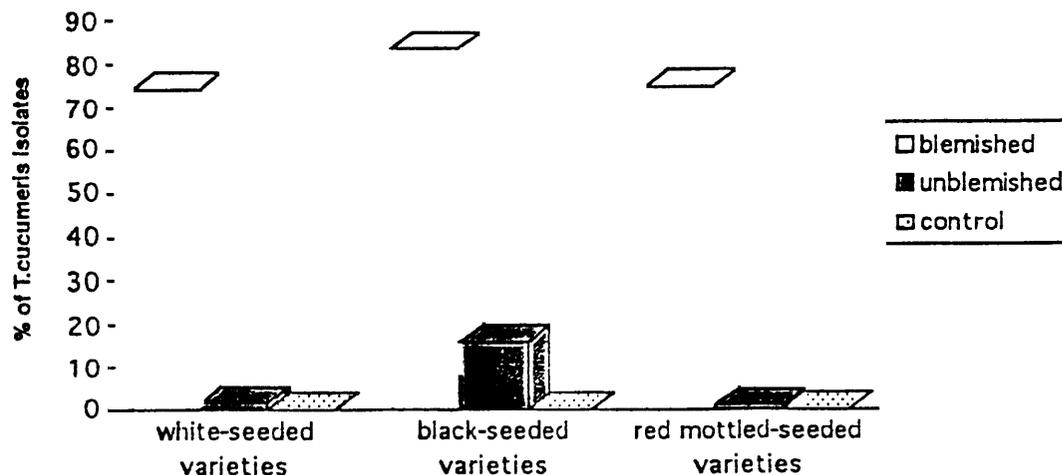
TABLE 1

Percentage of blemished seeds from web blight infected plants (*Thanatephorus cucumeris* AG-1-IB) of six line/varieties of *Phaseolus vulgaris* L. grown in Buena Vista, Dominican Rep., Fall, 1992.

<u>Lines/varieties</u>	<u>% blemished seeds</u>	<u>Lines/varieties</u>	<u>% blemished seeds</u>
Arroyo Loro (white seeded)	39	H-270 (black seeded)	30
Anacaona (white seeded)	30	PR-PC-450 (red mottled)	25
HT 7719 (black seeded)	11	PC-50 (red mottled)	33

FIGURE 1

Percentage of *T. cucumeris* isolates (AG-1-IB) obtained from seeds of web blight infected bean plants of white and colored-seeded- varieties. BV. SJM. Dominican Rep. Fall 1992



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