

Table 1. Effects of Seed Treatments on Recovery of Snap Bean Plants after a Hail Storm<sup>1</sup>

Treatments <sup>2</sup>	Root Rot <sup>3</sup> Severity ( <u>Fusarium</u> )	Fibrous Root Development	No. of Pods Per Plant
Control	3-4	Poor	9
MRC 156 (Copper) (5 oz./100 lb.)	1-2	Good	10
MRC 156 + Topsin M (5 and 3 oz./100 lb.)	2	Good	13
TCMTB (4 oz./100 lb.)	1	Good	18
Dowco 263 (4oz./100 lb.)	1	Good	17
COCS (5 oz./100 lb.)	3	Somewhat Poor	10
Topsin M (3 oz./100 lb.)	2	Good	18
Dithane Z-78 (5 oz./100 lb.)	3	Good	15

<sup>1</sup> Snap bean variety Early Gallatin was planted on June 10, 1974. The plants were almost destroyed by a hail storm on July 15. Final evaluation was made on September 10.

<sup>2</sup> Seed treatments were applied over the standard Captan-Dieldrin treatments.

<sup>3</sup> Root rot severity was rated using the following scale: 0, no infection; 1, light; 2, moderate; 3, severe; 4, severe with hollowed center; 5, plant dead.

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PHYSIOLOGICAL RACES OF PSEUDOMONAS PHASEOLICOLA  
(BURK) DOWSON IN BULGARIA

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Physiological races of Pseudomonas phaseolicola (Burk) Dowson, causal organism of halo blight of beans, were first reported by Walker and Patel in 1964 (Phytopathology 54: 952-4). Since then, race 1 and 2 have been reported by Bannerot (1964, Repport d'activite, SCAP,

Versailles), Epton and Deverall (1965, Plant Pathology 14: 53-4), Schuster, Coyne and Kerr (1965, Phytopathology 55: 1075), Wharton (1967, Plant Pathology 16: 27-31) and Hale and Taylor (1973, NZ J. Agr. Res. 16: 147-49). Halo blight of beans was first described in Bulgaria by Kovachevski in 1930, but the physiological variability has not yet been studied. In connection with the breeding programme of the "Maritsa" Research Institute of Vegetable Crops, Plovdiv, Bulgaria, we made 60 isolates of Pseudomonas phaseolicola (Burk) Dowson from different districts of Bulgaria, including crops of native bean varieties and crops of foreign canning bean varieties. For race determination, plants of cv. Kosecha (susceptible), Red Mexican UI-3 (resistant) and Bo 19 (resistant) were similarly inoculated, using the leaf watersoaking method described by Schuster (1955, Phytopathology 45: 519-20). Of the 60 isolates tested, 21 were found to be race 1 and the rest - race 2. Race 2 of the pathogen was isolated in 5 of the 9 districts observed. Results of the race determination test suggested that race 1 is wide-spread in the districts when native varieties were grown and race 2 in crops of introduced canning varieties.

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ABOUT THE DISEASE REACTION TO PSEUDOMONAS  
PHASEOLICOLA (BURK) DOWSON OF SOME TOLERANT  
OR RESISTANT BEAN LINES

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The reaction to Pseudomonas phaseolicola (Burk) Dowson race 1 and race 2 of some resistant or tolerant germplasm sources was studied in the "Maritsa" Research Institute of Vegetable Crops, Plovdiv, Bulgaria during the period of 1972-1974. Lines received from N. Bannerot, Sh. Honma, D. P. Coyne and D. J. Hagedorn (see the table) were used for the investigation. Some of them were known as resistant or tolerant to the bacterium Pseudomonas phaseolicola (Burk) Dowson, causing halo blight of beans (Bannerot 1964, Patel and Walker 1965, Rudolf 1966, Coyne, Schuster and Shaughnessy 1966, Hagedorn, Walker and Rand 1970).

Experiments were conducted in the greenhouse using isolates of Pseudomonas phaseolicola made by us in Bulgaria. Leaves were inoculated using the leaf watersoaking procedure described by Schuster (1955). Pods were inoculated by inserting dissecting needles as described by Hill, Coyne and Schuster (1972).

As we expected Red Mexican UI-3, Bo 19, Rona and PCL developed uniform resistant reaction on the leaves and pods when inoculated with race 1 and susceptible when inoculated with race 2. Ab 74 and CX 11-2-4 had the same reaction, although we expected them to be tolerant to race 2. GF 15-1-5-1-3 was only tolerant to race 1 while 71-2081, 71-2084 and PI 207262 had only tolerant leaves to race 1. 71-2067, 71-2108, HB 69-66 and Wis HBR 40 were susceptible to both races of the