in the screening program.

The procedures presented are a recapitulation of experiences over a period of years and even these are amenable to change or personal preferences.

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REACTION OF *Phaseolus* GERMPLASM TO DIFFERENT STRAINS OF *Xanthomonas phaseoli* AND *X. phaseoli* var. *fuscans*

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In a plant breeding program for resistance or tolerance to *Xanthomonas phaseoli*, it is desirable to have a knowledge of the genetic variation of virulence of the bacterium and to identify sources of *Phaseolus* germplasm which have high resistance or tolerance to the prevalent strains in a region or in different regions.

Several sources of *Phaseolus* germplasm have been reported in the literature as having tolerance to *X. phaseoli*. This germplasm has generally been tested only with isolates of the bacterium in a particular geographical region. We obtained isolates of *X. phaseoli* from infected seed sent to us from researchers in Uganda, Colombia, Brazil, and Michigan, USA. We had two isolates, Nebr *Xp*-816 and Nebr *Xp*-s, which we have used in our research program for a number of years. The purpose of the present investigation was to determine the reaction of the reported tolerant *Phaseolus* germplasm (*P. vulgaris*, PI 169727, PI 197687, PI 167399, PI 163117, PI 207262, PI 325677, PI 325684, PI 325691, GN Nebr. #1 sel. 27, Guali, *P. coccineus* PI 165421, *P. acutifolius* (Tepary, Nebr. acr #10) to a collection of *X. phaseoli* isolates. *P. vulgaris* Dark Red Kidney was used as a susceptible control. The plants were grown in the Fall of 1975 in the greenhouse in Lincoln, Nebraska under a photoperiod of 10 hours in order to induce early flowering of the short-day lines or varieties. Temperature was maintained at about 75° which is favorable for common blight disease development. A split plot design was used with bacterial isolates as main plots and varieties or lines as sub-plots. A multiple needle (florists frog) method of inoculation used previously by others, was used. The florists frog was dipped into the bacterial suspension (10^8 cells per ml.) and inserted into 2 separate leaflets of a mature trifoliate leaf about the center of the plant. The plants were inoculated about the time of early pod development. Disease readings were recorded at intervals after inoculation.

Great variation in the virulence of the different isolates was observed. The isolates, ranked in order of virulence, were *Xp*-Brazil, *Xp*-f-Uganda, Nebr *Xp*-816, Mich *Xp*-15, Nebr. *Xp*-s. *Xp*-Brazil showed very high virulence while Nebr *Xp*-s was weak in virulence. The isolate from Brazil was extremely virulent and all *Phaseolus vulgaris* germplasm previously reported as tolerant by various workers in different countries was susceptible to this isolate in this test. Since this study was completed, we noted in a preliminary study that *P. vulgaris* variety Lumarep PR. 35 from

Vilmorin, France and Tacarigua from Venezuela, S.A. showed a level of tolerance to the Brazilian isolate. The foliage and pods of P. acutifolius (Tepary #10) showed high tolerance while only the foliage of P. coccineus PI 165421 showed tolerance. The pods of P. coccineus were found to be susceptible to all isolates. Nebr. Xp-s showed only very weak virulence, and only slight symptoms developed on the susceptible check variety. GN Nebr #1 sel. 27, PI 207262, and PI 197687 showed high tolerance to all the US strains tested of the pathogen and are considered useful germplasm sources in breeding for tolerance in North America. PI 207262 and PI 197687 showed high tolerance to the Uganda isolate, and GN Nebr. #1 sel. 27 moderate tolerance. Guali (Colombia), PI 167399, PI 325684, and PI 169727 were susceptible to all isolates except the weakly virulent Nebr Xp-s and are considered to be poor sources of germplasm in breeding for common blight tolerance.

Crosses were made between GN Nebr. #1 sel. 27 and several sources of tolerant germplasm to determine if increased levels of tolerance to the Brazilian isolate could be obtained through transgressive segregation. Transgressive segregation for increased tolerance to this isolate was identified in progeny from some crosses and will be utilized in breeding programs in South America.

P. acutifolius is classified as resistant in foliage and pods to all tested strains since no visual symptoms of the disease are present, although we know from earlier studies that low populations of bacteria can exist in this germplasm. This is the most tolerant Phaseolus germplasm to use in a breeding program for resistance to X. phaseoli. Efforts should be renewed by breeders to overcome the embryo abortion resulting from the interspecific cross P. vulgaris x P. acutifolius.

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EPIPHYTIC POPULATIONS OF Xanthomonas phaseoli ON TOLERANT AND SUSCEPTIBLE LEAVES AND PODS OF Phaseolus vulgaris L.

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Previous experiments showed that Great Northern Nebraska #1 sel. 27 possessed foliage highly tolerant to Xanthomonas phaseoli (USA strains) when leaf watersoaking method was used while the pods were also highly tolerant both when watersoaked and inoculated with a dissecting needle. PI 150414 had moderately tolerant foliage and pods, while GN 1140 had very susceptible foliage and some pod tolerance. This experiment was conducted to determine the pattern of multiplication of X. phaseoli on the leaf and pod surfaces of this germplasm.

The three varieties were grown on the greenhouse bench where the temperature was maintained at about 80°F. A randomized complete block design was used with 3 replications of four pots, each containing 2 plants of each variety. Three trifoliates, one from the upper, one from the middle, and one from the lower part of each plant were selected for this study. The lower and upper surfaces of these selected trifoliates were