

ally rather susceptible but there were some exceptions showing good resistance. However, breeders selecting for root rot tolerance should be warned that they may be including genes for leaf hopper susceptibility.

We have done some screening under controlled conditions and agreement between field and laboratory damage rating has been good.

We plan to further check resistance of selected lines and to try and study the inheritance of resistance.

Damage was rated on a scale of 0-5 with 5 being very severe and 0 being undamaged. The data are only on the basis of two replications and one season, but may be helpful to some breeders.

Scale 0 - Tenderette, Eagle, Tekoa, Sunrise, Genuine Cornfield, Processor, Gallatin 50, Kinghorn Wax, Sprite, BBL 274, SW59, WHBR72, Venezuela 54, B3088, Alabama 1, A/S 51, ICA Tui.

Scale 1 - Strike, F. Gallatin, Slenderette, Tendercrop, GV 199-1, W.S. Provider, Blue Crop, Rebel, Regal, Miami, Green Isle, Lake Shasta, Lake Superior, Astro, Res. Kinghorn Wax, Maestro, Galaslim, SWFM51, New Pioneer, Idelight, B 3993, Alturas, Canario Divex

Scale 2&3 - Earliwax, Bonanza, Slimgreen, Rubicon, Moongold, Aurora, Avalanche, Luna, ICA Guali, Comp. Chimaltenango #2, Wintergreen, Porrillo 70, Chilean SW, Bonus, Immuna, Actopan, Chicobel, Jamapa, Fin de Fin, Daisy, Rico 23.

Scale 4&5 - Cornell 2114-12, Golden Wax Topnotch, Kolibri, 165426W&C, 165435, N203, OSU1604, Redland Greenleaf C, Windsor Long Pod, B4096C&W, Santa Ana, SWIC94, Kerman, Blue Lake, NVRS 194, Dade, Golden Gate Wax, Bolotti and Bonita.

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SUBOPTIMUM TEMPERATURE TOLERANCE IN RELATION  
TO EARLY GROWTH OF *Phaseolus vulgaris* L.

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Most advances in early maturity of beans have, in the past, been attained by selection for early flowering or pod maturity. Little attention has been placed on selection for rapid germination and seedling development as it may affect early growth and flowering. It may be that the interval from seeding to flowering may be reduced by selecting lines capable of rapid growth during periods of low temperatures following seeding. If this assumption is valid, then the identification of potential germ plasm with tolerance to sub-optimum temperatures during early seedling growth may be of considerable value in developing earlier bean cultivars.

Evidence of low temperature tolerance in beans during germination was

obtained by Kooistra (3) and Dickson (1). Investigations conducted by Kemp (2) with respect to flower bud initiation gave support to the potential of rapid growth and development under temperatures of 10°C. Investigations at the Agriculture Canada Research Station at Lethbridge were established to screen a collection of early bean accessions acquired from the USDA Plant Introduction Stations at Pullman, Washington, and at Geneva, New York. Between 300 and 400 lines have now been assessed for speed of germination, speed of emergence, and rate of seedling leaf growth at a temperature of 10°C maintained in C. E. growth facilities.

All testing was conducted with seed produced in the greenhouse and pre-conditioned to adjust the moisture content to 13 percent. Germination screening was conducted by placing seed in germination papers, rolled into tubes, and thoroughly moistened with water at 10°C. After excess water had drained, they were placed in a controlled environment cabinet at 10°C and daily counts were taken and the speed of germination and percent germination recorded. After repeated testing, six lines consistently gave a superior performance: Comtesse de Chambord, Burbank, P.I. 207229, P.I. 300680, P.I. 302534, and P.I. 302542.

Prior to screening for speed of emergence, lines were preconditioned and pregerminated. Germinated seeds with their radicles no more than 0.5 cm long were planted to a standard depth in moist vermiculite and kept at a temperature at 10°C for 14 days after which the temperature was increased to 20°C. Seedling emergence was recorded daily at both temperature levels. No conclusive evidence of low temperature tolerance during emergence was obtained as the lines with a high rate of emergence were small seeded and included among others C de Chambord.

Seedling growth rate after emergence was assumed by detection of the change in leaf area during 14 days exposure to 10°C. Although a number of lines were identified with high leaf area growth only two were consistently high in all tests, i.e., Limelight and P.I. 136701.

We are presently using P.I. 300680, Limelight, and P.I. 136701 in our breeding program to determine how much earlier flowering and good potential may occur.

#### References

- Dickson, M.H. 1971. Breeding beans, Phaseolus vulgaris L., for improved germination under unfavorable temperature conditions. *Crop Sci.* 11: 848-850.
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