

Performance of Half Runner Type Bean Cultivars and Breeding Lines, 1999

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Introduction

'White Half Runner' is a popular bean cultivar grown in Tennessee and in the Southern Appalachian area. Most production is in home gardens and small acreages for local markets. Plants of commercially available Half Runner type cultivars are highly susceptible to viruses and rust caused by *Uromyces appendiculatus*. University of Tennessee and USDA bean breeding programs included Half Runner type beans. The major objective of the two programs was to select lines with resistance to rust and possibly viruses. Three selections from the USDA program were released as breeding lines, and a more advanced selection from BelTenn-RR-2 is being increased for commercial production for naming, with 'Volunteer White Half Runner' being a proposed name. An experiment was conducted in 1999 at The University of Tennessee Plateau Experiment Station at Crossville, Tennessee to evaluate and compare the performance of 10 Half Runner type bean selections from both breeding programs to 'White Half Runner'.

Materials and Methods

Following a spring turnip greens crop, the site was tilled on July 20. Fertilizer was broadcast at 300 lb/A of 15-15-15 before final tillage. Plots were planted on July 21 at a seeding rate of approximately 8 seeds per foot of row. Plot size was one row, 10 ft long, and rows were spaced 38 in. apart. Plot design was a randomized complete block with 4 replications. Esfenvalerate (Asana XL) was applied at 0.05 lb ai/A on Sept 17 for insect control. Plant height, plant width and visual rust ratings (scale of 1 to 10) were made prior to harvest. Harvest of all selections was once-over by hand on Sept 29. Yields of the harvested pods were recorded, and average pod length and pod diameter were determined. Ratings were made for pod curvature, pod smoothness, and conformity or similarity to 'White Half Runner' pods. All data were analyzed by analysis of variance procedures, and means of dependent variables significant at the 0.05 level of probability were separated by Duncan's multiple range tests.

Results and Discussion

Plant height averaged 40.6 cm (16.0 in.) and plant width averaged 66.5 cm (26.2 in.), and differences among the lines tested were not significant. Leaves of 'White Half Runner' plants were rated as more susceptible to rust than all lines except 'UT-1' (Table 1). Leaves of plants of 'UT-2' also were highly susceptible to rust. Lines 'UT-3' and 'UT-4' were slightly to moderately tolerant to rust. The BelTenn selections were from a parent with resistance to all known pathogenic strains of the rust fungus. Line 'UT-3' was among the most productive lines in the trial, and most lines produced well for once-over harvest.

Most of the breeding lines produced shorter pods than 'White Half Runner' (Table 1). 'BelTenn 4-12046' produced shorter pods than most other breeding lines. Lines 'UT-1', 'UT-2', and 'UT-3' produced pods with a larger diameter than most of the other selections. Pods of 'UT-3' were among the roughest pods of lines evaluated in the trial. Pods of most of the BelTenn selections were rated as smoother than pods of 'White Half Runner'. Pods of 'White Half Runner' were rated as less like White Half Runner than pods of the BelTenn lines; and the UT lines were rated less like 'White Half Runner' than the 'White Half Runner' strain used in the trial. The 'White Half Runner' strain used in this trial produced many rough and flat pos. 'White Half Runner' lines are susceptible to development of flat pods which are usually high in fiber. Lines 'UT-3' and 'UT-4' were rated as among lines with the most pod curvature. Virus symptoms were not observed in the trial. The BelTenn lines are known to have the homozygous I gene for resistance to common bean mosaic, which is a problem virus of 'White Half Runner'

Table 1. Plant and pod characteristics and pod yields of 'White Half Runner' type breeding lines evaluated at The University of Tennessee Plateau Experiment Station, Crossville, 1999.

Line	Rust rating ^x	Pod yield (bu/A)	Pod length (in.)	Pod diam. (in.)	Pod smoothness rating ^y	Pod type rating ^y	Pod curvature rating ^y
BelTenn 5-2717	0.0e ^z	300ab	4.13de	0.46bc	4.0ab	4.7abc	4.50a
BelTenn-RR-2	0.0e	313ab	4.50ab	0.45c	3.8bc	4.6bc	4.10bcd
BelTenn 4-12028	0.0e	265bc	4.00e	0.45c	4.0a	4.8ab	4.50a
BelTenn 4-12046	0.0e	313ab	4.00e	0.45c	4.0a	5.0a	4.20cd
BelTenn 4-12053	0.0e	311ab	4.31bcd	0.48abc	4.2a	4.9a	4.43bc
BelTenn 4-12063	0.0e	303ab	4.44b	0.45c	4.2a	5.0a	4.43bc
White Half Runner	6.5b	302ab	4.69a	0.49ab	3.8c	4.4c	4.05cd
UT 96-1	7.5a	266bc	3.8bc	0.50a	4.0ab	4.0d	4.45b
UT 96-2	5.3c	334ab	4.44b	0.49ab	3.8c	3.8de	4.05cd
UT 96-3	0.2e	355a	4.44b	0.50a	3.4d	3.6e	3.83d
UT 96-4	2.5d	227c	4.19cde	0.45c	4.0a	4.4c	4.00d

^x Rating on a scale of 1 to 10; 1=no rust, 10=defoliation due to rust.

^y Ratings on a scale of 1 to 5; 1=poor, 5=most acceptable.

^z Means within a column followed by the same letter are not significantly different at the 0.05 level of probability, Duncan's multiple range tests.