

Evaluation of Snap Bean Cultivars for Pod Detachment Force¹

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Abstract. In strain gauge tests of sieve size 4 pods of snap bean (*Phaseolus vulgaris* L.), 'Idelight' and 'Green Isle' required the lowest pod detachment force (PDF) of 13 genotypes tested.

Snap bean cultivars vary widely in the force necessary to separate the pods from the plant. Showalter (5) observed that cultivars requiring high PDF have more broken pods and more stems attached to the pods after mechanical harvest than cultivars with low PDF; therefore, high PDF may reduce marketable yield and require more sorting in the packing or processing line.

The PDF of a breeding line or cultivar is important to determine adaptation to mechanical harvesting, and all advanced lines should be tested for this character. The cultivars evaluated in this study were selected for their adaptation to mechanical harvest. The objective was to identify potential parental cultivars which combined low PDF and excellent horticultural qualities.

A strain gauge was used to measure PDF in the manner of Showalter and others (1, 2, 4). The Ametek Model LKG-5 with a metric scale was used for direct measurement. The hook attachment was modified to narrow the gap to between 1 and 2 mm. All the pods on each plant were removed by hooking the pedicel and pulling straight up by hand. A randomized complete block design was used with 3 replications.

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The PDF increased with increasing sieve size until the pods were too large for market (Table 1). Only sieve size 4 pods were used to separate PDF differences between cultivars because this procedure minimizes variation in pod maturity within cultivars, although it probably does not compare equivalent maturities between cultivars in terms of fiber content and seed size. Sieve size 4 was used as a measure of harvest "maturity" because the market prefers this size.

The higher PDF cultivars had about twice the value of 'Idelight'; and 8 of the genotypes tested had lower PDF than 'Provider', the "lowest" cultivar previously reported (3, 4).

Conceivably, PDF can be so low that the pods will detach too easily and fall

to the ground before they can be swept into the harvester. However, other factors confound any attempt to determine an optimum PDF, e.g., the no. of branches on the plant, pod thickness and brittleness at the "neck," amount of pod fiber, distribution of the pods on the plant, and pod length.

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Table 1. Pod detachment force (PDF) of 13 snap bean cultivars including pods of 5 sieve sizes.

Cultivar	Pod detachment force (kg) ²					LSD 5% (within cultivars)
	Sieve Size					
	2	3	4	5	6	
B4000-1	0.84	1.37	1.90a ³	2.08	2.42	0.63
Slender White	0.82	1.18	1.72ab	2.00	2.12	0.45
Rebel	1.22	1.46	1.69ab	2.58	3.12	0.67
B 3803	0.82	0.97	1.40abc	1.69	1.59	0.52
Provider	0.89	1.26	1.38abcd	1.99	2.62	0.52
Processor	0.90	1.25	1.38abcd	1.50	1.22	0.46
Gallatin 50	0.77	1.28	1.38abcd	1.70	1.77	0.41
Spartan Arrow	0.85	1.01	1.35 bcd	1.42	—	0.53
X-Ida 92-4	0.82	0.92	1.29 bcd	2.10	—	0.78
Tenderbest	0.79	1.07	1.27 bcd	1.27	1.76	0.39
Tendercrop	0.86	0.98	1.25 bcd	1.45	2.09	0.41
Green Isle	0.82	0.78	1.13 cd	1.77	2.21	0.37
Idelight	0.61	0.61	0.86 d	1.42	1.70	0.27
Mean	0.85	1.09	1.38	1.77	2.20	0.11

²Each value is the mean of 3 replicates.

³Mean separation by Duncan's multiple range test, 5% level. Values based on 13-17 plants and 29-86 pods per cultivar.

Apex Removal and Single-harvest Yield of Side Shoots of Broccoli¹

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Abstract. Hand pinching of newly initiated central heads of two cultivars of broccoli (*Brassica oleracea* L. *Italica* group) resulted in uniform development of several side shoots, enabling a single harvest of high-quality side shoots. The yield of side shoots of 'Waltham 29' was higher than the yield of central heads of nonpinched plants. For 'Green Duke', no difference in yield was found due to treatment. The time of pinching was crucial with 'Waltham 29' but not with 'Green Duke'.

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The cultivation of green sprouting broccoli has been expanded recently in many countries, with increased demand stimulated chiefly by the vegetable freezing industry. Uniform maturity is essential for mechanical harvest and further expansion of this crop. Attempts have been made to obtain a large single harvest of small central heads, by using dense plant populations (1, 2, 3, 6). This is in keeping with the demands of the freezing industry, which generally prefers the quality of smaller sized heads. Another possibility to obtain smaller heads is to increase the

proportion of side shoots, which usually develop after the central head is cut. However, the prolonged harvesting period of these shoots, and their low weight, markedly increase the costs of the raw material, jeopardizing its profitability. To overcome this obstacle, we studied the effect of pinching the central heads at an early stage in order to achieve a concentrated yield of side shoots in a single harvest. This line of research was tested previously in prolonged multiple harvest, but in every case the yields of the lateral shoots resulted in a lower total yield (4, 5).

The 3 experiments reported on here involved 2 cultivars, the open-pollinated 'Waltham 29' and a new hybrid, 'Green Duke'. The experiments were carried out at the Bet Dagan Experiment Station (expt. 1), in a commercial field at Nir-Galim in the central coastal plain