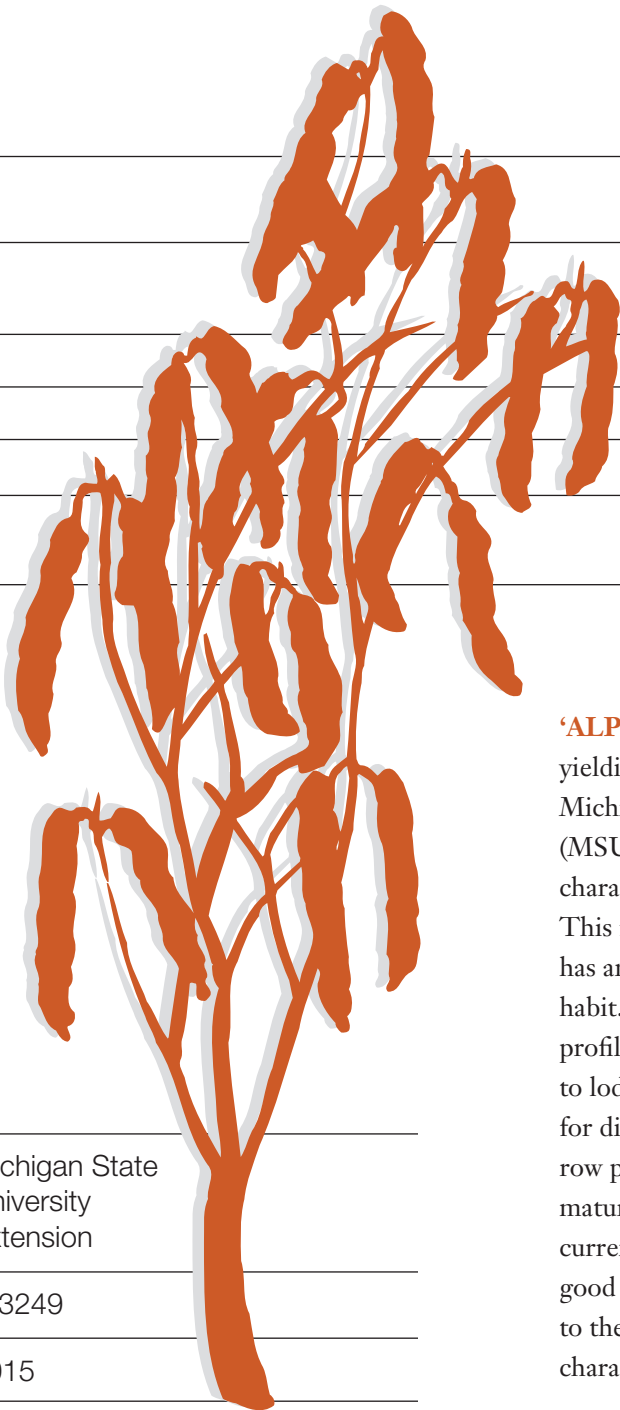


NEW from MSU

'Alpena'

A New
Navy Bean Variety

for Michigan



- New upright full-season navy bean variety suited for direct harvest.
- Exhibits uniform maturity coupled with good plant dry down at maturity.
- Matures in 99 days ahead of most current navy bean varieties.
- Suited for northern production areas.
- White mold avoidance due to upright plant habit.
- Attractive navy bean seed that possesses excellent canning quality.

'ALPENA' is a new erect, high-yielding navy bean variety from Michigan State University (MSU) that combines unique characteristics for bean producers. This full-season maturing variety has an upright, short vine growth habit. The upright narrow plant profile, combined with resistance to lodging, makes 'Alpena' suitable for direct harvest under narrow row production systems. 'Alpena' matures a few days earlier than current varieties and exhibits good dry down when compared to the persistent green stem characteristics exhibited by current

navy bean varieties at harvest. It resembles 'Indi' best in dry down and agronomic traits but has out-yielded 'Indi' by 7% over 22 locations. 'Alpena' shows excellent resistance to lodging equivalent to 'Merlin' and better standability than 'Medalist', 'T-9905' and 'Vista'. It is equivalent to 'Medalist' and 'Merlin' in tolerance to white mold and is resistant to strains of bean rust and bean common mosaic virus (BCMV) present in Michigan. The seed of this variety is similar in size to that of 'Medalist' and possesses similar canning properties.

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Origin and Breeding History

‘Alpena’, tested as MSU navy bean breeding line N11283, was developed from the cross of ‘Medalist’/N08003. Released by Provita Inc., ‘Medalist’ is a high-yielding upright navy bean variety that was derived from a cross of ‘Mayflower’/‘Avanti’. The MSU breeding line N08003 was a high-yielding, upright navy bean line that exhibited good dry down at harvest but lacked good canning quality. The purpose of the cross was to develop a new high-yielding, upright navy bean variety that exhibited better standability and dry down at harvest. Most of the current navy bean varieties exhibit a green stem trait at harvest necessitating the application of harvest aid desiccants to mature the crop for direct harvest.

Agronomic and Disease Information

‘Alpena’ exhibits the upright type-II indeterminate short vine growth habit combined with good resistance to lodging (1.6 on a 1–5 scale). Varieties such as ‘T-9905’ and ‘Vista’ tend to lodge more, which complicates direct harvest. Plants average 22 inches in height, similar to the height of ‘Medalist’ and taller than other navy bean varieties. ‘Alpena’ is a full-season bean maturing 99 days after planting. The range in maturity is from 88 to 105 days, depending on season and location. ‘Alpena’ matures earlier than ‘Medalist’ and ‘Merlin’, and three days later than ‘Indi’. ‘Alpena’ has demonstrated better uniform maturity and dry down when compared to most navy bean varieties except ‘Indi’. Most varieties exhibit green stem characteristic and leaf retention

when pods are dry requiring the use of a desiccant to facilitate direct harvest. ‘Alpena’ has a high agronomic acceptance rating based on its upright habit, resistance to lodging, excellent pod load and favorable high pod placement in the plant canopy as well as uniform dry down.

‘Alpena’ has been tested for four years (2011–2014) in 34 locations by MSU researchers in cooperation with colleagues in Michigan and Ontario. The combined yield data comparisons with other navy cultivars are shown in Table 1. Over 34 locations, ‘Alpena’ yielded 25.4 hundredweight per acre (cwt/acre) equivalent in yield to ‘Medalist’. ‘Alpena’ out-yielded ‘Indi’ by 7% and ‘Vista’ by 15%, whereas ‘Merlin’ and ‘T-9905’ out-yielded ‘Alpena’ by 3% and 6%, respectively over 25 locations. Yields of ‘Alpena’ have ranged from a high of 39 cwt/acre at the Saginaw Valley Research and Extension Center, in Frankenmuth, Michigan, in 2014, to a low of 11.4 cwt/acre under severe white mold conditions in Huron County, Michigan, in 2014.

Planted in narrow rows (20 inches) and combined with direct harvest, ‘Alpena’ has produced competitive yields over 30 cwt/acre in Michigan and Ontario, where navy beans are grown commercially. ‘Alpena’ appears to be well adapted to this increasingly popular management system. Growers should follow current recommended practices for fertility and weed control in growing ‘Alpena’ beans. Recommendations can be found online from the Saginaw Valley Research and Extension Center (agbioresearch.msu.edu/saginawvalley) and MSU Weed Science (msurweeds.com).

‘Alpena’ possesses the single dominant hypersensitive I gene, which confers resistance to seed-borne BCMV. All the navy varieties listed in Table 1 possess the same resistance gene. ‘Alpena’ exhibits similar tolerance to white mold compared to other navy bean varieties. Percent white mold in ‘Alpena’ was 37% compared to ‘Medalist’ (31%), ‘Merlin’ (26%), ‘T-9905’ (43%) and ‘Vista’ (43%) when grown in irrigated trials over 3 years. Both ‘Vista’ and ‘T-9905’ tend to lodge more, which contributes to higher white mold scores. ‘Alpena’ exhibits a similar range of reactions to other pathogens as do other commercial navy bean varieties. It is susceptible to anthracnose and common bacterial blight; it possesses resistance to some races of rust but is susceptible to rust race 22:2 now prevalent in Michigan.

Quality Characteristics

‘Alpena’ has a typical small-sized navy bean seed, averaging 19 g/100 seeds and a size range from 18 to 21 g/100 seeds. The seed is similar in size and appearance to other navy bean varieties except ‘T-9905’, which has a larger seed size (23 g).

In canning trials, ‘Alpena’ has been subjectively rated by a team of trained panelists as being excellent in cooking quality. This evaluation is based on whole bean integrity (no splitting or clumping), uniformity of size (uniform water uptake) and clear brine (no starch extrusion into canning liquid). ‘Alpena’ rated 3.7 on a scale of 1 to 5 where 5 is best and 3 is mid-scale (neither acceptable nor unacceptable). The visual rating was equivalent to ‘Merlin’, lower than ‘Medalist’ and higher than other navy bean varieties. Data on L-color (lightness scale) of cooked

Table 1. Comparison of yield, agronomic, disease and canning characteristics of ‘Alpena’ with five other navy bean varieties over 4 years testing (2011-2014) in Michigan and Ontario

| Traits | Varieties | | | | | |
|--|-----------|------------|----------|--------|----------|---------|
| | ‘Alpena’ | ‘Medalist’ | ‘Merlin’ | ‘Indi’ | ‘T-9905’ | ‘Vista’ |
| Agronomic traits | | | | | | |
| Days to flower | 45 | 45 | 44 | 44 | 45 | 47 |
| Days to maturity | 99 | 100 | 104 | 97 | 104 | 99 |
| Height in inches | 22 | 22 | 21 | 21 | 20 | 20 |
| Lodging score ^a Average (1–5) | 1.6 | 1.9 | 1.6 | 1.2 | 2.2 | 2.5 |
| Agronomic index ^b Average (1–7) | 5.3 | 4.0 | 4.1 | 4.3 | 4.2 | 4.1 |
| 100-seed weight in grams | 19.2 | 19.6 | 19.9 | 20.0 | 23.3 | 19.9 |
| Mean yield ^c (cwt/acre) | 25.4 | 25.4 | 26.1 | 23.4 | 27.2 | 21.7 |
| Yield percentage | 100 | 100 | 103 | 93 | 106 | 85 |
| Disease resistance traits ^d | | | | | | |
| BCMV ^e | R | R | R | R | R | R |
| Anthracnose: race 73 | S | S | S | S | S | S |
| Rust race 22:2 | S | S | S | S | S | S |
| Common bacterial blight | S | S | S | S | S | S |
| White mold percentage ^f | 37 | 31 | 26 | 33 | 43 | 43 |
| Canning quality traits | | | | | | |
| Color L-scale ^g | 55.5 | 53.6 | 54.2 | 55.3 | 54.1 | 54.5 |
| Texture ^h (kg/100g) | 36 | 33 | 34 | 38 | 26 | 41 |
| Visual rating ⁱ | 3.7 | 4.2 | 3.7 | 3.2 | 2.7 | 3.0 |

^a Lodging: 1 = Erect, 5 = Prostrate

^b Agronomic Index: 1 = Worst, 7 = Excellent

^c Yield was averaged over 34 locations from 2011 to 2014

^d Diseases: R = Resistant, S = Susceptible

^e BCMV = Bean Common Mosaic Virus

^f White Mold: Percentage of disease incidence and severity

^g Color L-scale: Lightness scale, higher number indicates the whiter the product

^h Texture: Kg of force needed to compress 100 g canned beans

ⁱ Visual Rating: 1 = Very undesirable, 3 = Neither desirable nor undesirable, 5 = Very desirable

beans showed that ‘Alpena’ was slightly whiter in color (55.5) than the other navy beans as the higher value indicates whiter color following canning. No major differences among varieties were observed for texture that ranged from 26 to 44 kg /100g. The texture of ‘Alpena’ was 36 kg /100 g, which was within the acceptable range of 30 to 60 kg/100g for processed navy beans. ‘T-9905’ had the lower texture (26 kg), which would indicate an unacceptable product that is also reflected in lower visual rating (2.7). ‘Alpena’ possesses excellent canning quality equivalent to ‘Medalist’ in overall acceptability.

Release and Research Fee

‘Alpena’ was released by Michigan State University with the option that ‘Alpena’ be sold for seed by variety name only as a class of certified seed under the three-class system used in Michigan (breeder, foundation, certified). A royalty will be assessed on each hundredweight unit of either

foundation seed or certified seed sold depending on the production location (east or west of the continental divide). Plant Variety Protection (PVP) from the USDA Agricultural Marketing Service is anticipated. Parties interested in licensing ‘Alpena’ may contact MSU Technologies (technologies.msu.edu) by phone at 517 355-2186 or by e-mail at msut@msu.edu.

Acknowledgments

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