

Avalanche Navy Bean



**North Dakota State University
Department of Plant Sciences
Dry Bean Breeding Program**

Avalanche Navy Bean

Avalanche is a navy bean line selected from the cross 96-177-01-01//Voyager/Black Knight, which was made in 1999. It was the final step of a hybridization series that involve some crosses made back in 1985. This cross was an attempt to combine several traits such as good yield, earliness, erect architecture, desirable seed characteristics, and multiple disease resistance. 96-177-01-01 is a line from the NDSU dry bean breeding program involving several lines from Michigan State University (N90618, N90616, and N85007), ICA Bunsu, Northland, Norstar, and some other experimental lines from the NDSU breeding program (see Figure 1). Ica Bunsu, N91618 and N90616 have some degree of resistance to white mold. Additionally, several of the lines involved in this cross have upright architecture.

In the summer of 1999, the F1 seed was grown in the field in Fargo, ND. Obtained F2 seeds were then planted in spaced-plant rows at Hatton, ND in 2000 and individual plants were selected and harvested. Seed from each plant was grown at Puerto Rico winter nursery in 2001. The line Avalanche was selected and F4 seed was bulk harvested and sent back to ND. Given its excellent visual appearance for architecture, yield potential (pod load), maturity, plant growth habit, and lack of disease symptoms, the line was directly included in the navy preliminary yield trials (NPYT) at two locations in ND (Erie and Hatton) in the summer of 2001. AVALANCHE was one of the best lines in these trials and therefore it was moved up to the navy advanced yield trials (NAYT) for additional testing across years and locations. From 2002 to 2007, the line has been tested at more than 24 environments across ND and MN as well as other states (MI, NE, and CO). Seed yield of Avalanche ranged from 11.1 to 35.6 cwt/a (see Table 1). Avalanche have shown excellent performance across most of the environments tested, with yields superior to other navy commercial varieties. Data showed that Avalanche out yielded Vista and Mayflower by 7.9 and 8.6%, respectively.

Avalanche is a medium maturing, high yielding navy bean, with very good seed size, shape, and appearance. The seed is very uniform in size, and of similar appearance. Avalanche has white flowers, dark green leaf color, is erect (Type II, short vine), with good lodging resistance. Avalanche exhibits good synchronous plant dry-down prior to harvest (both plant and pods mature concurrently). Maturity is earlier than Vista and Mayflower. The upright plant structure, combined with its synchronous dry-down, suggests that this line may be suitable for direct combining, given appropriate equipment and operator care.

Avalanche is resistant to bean common mosaic virus (BCMV), but it is susceptible to the necrotic strain (BCMNV). Avalanche is moderately resistant to rust and it is being tested for anthracnose resistance. Canning tests made at Michigan State University showed that Avalanche was close to Vista in terms of visual appearance and quality.

The NDSU dry bean breeding program is able to release this navy line thanks to the support of several people and institutions, including Dr. Ken Grafton, previous dry bean breeder, the program staff, and other bean breeding programs such as Michigan State University for allowing germplasm exchange and field and disease testing. A special acknowledgement for all the long term support given by Northharvest Bean Growers Association, and the North Dakota Dry Edible Bean Seed Growers Association (NDDEBSGA).

Table 1. Yield Performance (cwt/a) of AVALANCHE Compared to Check Cultivars Grown in Common Environments.

Year	Trial-Location*	Avalanche**	MAYFLOWER	VISTA
2001	NPYT-Erie	18.5	17.4	21.2
2001	NPYT-Hatton	25.2	22.6	23.2
2002	NAYT-Erie	21.6	20.6	21.0
2003	NAYT-Hatton	11.1	9.7	10.3
2003	NAYT-Johnstown	19.9	10.9	--
2004	NAYT1-Carrington	11.4	8.7	13.4
2004	NAYT1-Hatton	14.7	11.6	11.2
2004	NAYT1-Johnstown	16.6	17.4	11.1
2004	NAYT1-Prosper	22.9	17.4	18.3
2005	NAYT-Carrington	14.4	13.0	13.8
2006	NAYT-Hatton	32.5	28.3	34.0
2006	NAYT-Johnstown	15.0	10.2	11.7
2006	NAYT-Prosper	27.4	25.0	19.7
2006	ADM-Northwood	15.6	--	17.5
2006	NVT-Carr.-Dryland	12.1	--	7.6
2006	NVT-Carr.-Irrigated	32.3	--	26.7
2006	NVT-Langdon	35.6	--	38.7
2006	NVT-Minot	26.3	--	22.6
2006	NVT-Forest River	17.4	16.7	16.4
2006	NVT-Hatton	19.8	15.4	17.4
2006	NVT-Prosper	27.9	29.7	26.8
2007	NAYT-H	13.4	11.9	12.8
2007	NAYT-Johnstown	31.5	24.1	27.4
2007	NVT-Carr.-Dryland	32.5	29.1	28.9
2007	NVT-Carr.-Irrigated	28.9	28.2	26.8
2007	NVT-Cavalier	31.5	--	29.8
2007	NVT-Langdon	31.9	30.1	29.2
2007	NVT-Minot	14.9	18.6	18.1
Mean across 21 env.	21.4	19.3	19.7	
Mean across 27 env.		22.3		20.6
Mean across 22 env.		21.3		18.9

* NPYT = Navy Preliminary Yield Trial, NAYT = Navy Advanced Yield Trial, NVT = Navy Variety Trial, ADM = Archer Daniels Midland dry bean trial.

** Cells are in bold where the line out yielded the commercial checks.

Table 2. Comparison of AVALANCHE with commercial check cultivars for agronomic and disease reactions summarized from several tests in ND.

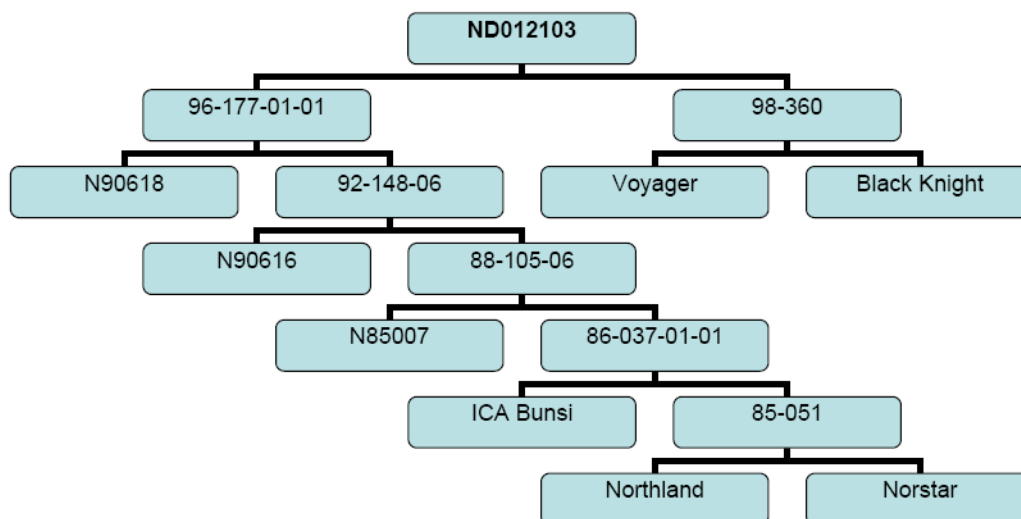
Trait	Avalanche	Vista	Mayflower
Maturity (d)	102	103	107
Seed Size (g)	18.4	18.2	18.7
Growth Habit	II	II	II
Pl. Height (cm)	53	55	58
Lodging (0-9)	2	1	1
Rust	MR	R	R
BCMV	R	R	R

Growth Habit = CIAT scale where I = determinate bush; II = upright, short vine (IIb tendency toward floppiness); III = prostrate vine (IIIa will be erect in certain environmental conditions); IV = indeterminate climber.

Lodging scores 0 = 100% erect, 9 = no erect plants

Rust and BCMV: R= Resistant, MR= Moderately Resistant, S=Susceptible

Figure 1. Pedigree of navy line ND012103





AVALANCHE