North Dakota State University - Dry Bean Breeding Program

ND Pegasus (ND121630) Great Northern (GN)

Attributes:

- Superior seed yield compared to other commercial cultivars
- Excellent upright plant architecture
- Excellent seed quality
- Resistance to BCMV (*I* gene)
- Uniform drydown
- Intermediate resistance (tolerance) to white mold
- Acceptable canning quality

Limitations:

- 3-4 days later maturity compared with some commercial cultivars

ND Pegasus is the result of a cross Lariat / G07302 made in 2009. Lariat is popular pinto cultivar released in 2008 by North Dakota State University with very high seed yield potential, semi-upright architecture, and good seed quality. Breeding line G07302 is from Michigan State University and was obtained from a cross of G02646/AN37. AN37 is a well-known source of resistance to white mold. G02646 is an upright GN line also from Michigan State University with good agronomic traits (J. Kelly, pers. comm.).

ND Pegasus has upright architecture (type IIa) with medium-short vines. Under North Dakota conditions (Tables 1, 2, and 3), ND Pegasus shows significant higher seed yield compared with other GN cultivars commonly used in the region, average plant height is 71 cm, seed size is 36.8 g per 100 seeds, and matures in approximately 103 days. ND Pegasus has white flowers and based on greenhouse and DNA marker data, it is resistant to Bean Common Mosaic Virus (BCMV). Given its pedigree, and as shown in greenhouse evaluations, ND Pegasus has intermediate resistance to white mold (Table 3). ND Pegasus has excellent seed (shape and size), larger than most commercial cultivars commonly grown in the region. ND Pegasus has acceptable canning quality based on some pilot testing. Other agronomic traits of economic importance such as seed shape/size, days to flower and maturity are within commercial acceptable ranges.

Table 1. Seed yield of ND Pegasus GN and commercial cultivars commonly grown in the MIN-DAK region across 35 environments (2013-2018).

Year	Year/Trial/Location†	ND Pegasus	Matterhorn	Aries	Powderhorn	Taurus
2013	13 GNPYT HAT	15.2	13.0	-	-	-
2013	13 GNPYT PRO	26.6	17.4	-	-	-
2014	14 GNAYT CAR	17.0	12.8	14.0	-	-
2014	14 GNAYT HAT	37.7	17.1	31.1	-	-
2014	14 GNAYT JOH	36.8	30.3	32.5	-	-
2014	14 GNAYT PRO	23.1	20.9	21.3	-	-
2015	15 GNAYT CAR	21.5	22.3	18.9	17.3	-
2015	15 GNAYT HAT	20.1	15.4	17.6	17.2	-
2015	15 GNAYT JOH	22.3	15.6	12.7	17.5	-
2015	15 GNAYT PRO	21.0	12.6	10.8	10.9	-
2015	15 MRPN HAT	19.2	16.6	-	-	-
2015	15 MRPN MIC	32.1	16.2	-	-	-
2015	15 MRPN NEB	23.3	14.7	-	-	-
2015	15 MRPN COL	39.1	28.9	-	-	-
2015	15 MVT FRR	26.4	21.1	-	18.9	-
2015	15 MVT HAT	23.4	18.6	20.1	20.1	-
2015	15 MVT PRO	20.6	16.2	-	11.2	-
2016	16 GNAYT CAR	14.2	4.2	8.7	5.9	12.3
2016	16 GNAYT HAT	25.1	19.2	20.3	18.1	25.3
2016	16 GNAYT PRO	20.3	16.2	18.9	14.0	22.5
2016	16 MVT HAT	27.8	20.3	25.0	21.1	26.9
2016	16 MRPN HAT	22.3	19.9	-	-	-
2016	16 MRPN MIC	18.6	18.9	-	-	-
2016	16 MRPN NEB	19.8	17.3	-	-	-
2016	16 MRPN COL	17.0	17.0	-	-	-
2017	17 MVT FRR	32.5	28.0	33.5	27.7	31.7
2017	17 MVT HAT	31.7	24.8	27.4	25.7	31.5
2017	17 GNAYT CAR	22.9	21.2	18.3	18.3	-
2017	17 GNAYT HAT	10.0	4.9	5.7	7.7	-
2017	17 MRPN HAT	14.8	12.8	-	-	-
2017	17 MRPN MIC	18.7	13.5	-	-	-
2017	17 MRPN NEB	34.3	32.4	-	-	-
2017	17 MRPN COL	24.1	23.4	-	-	-
2018	18 MVT FRR	26.8	24.5	22.9	26.6	-
2018	18 MVT HAT	23.6	24.6	28.3	25.7	26.0
	***Total Means:**					
	35 common environments	**23.7a**	**18.7b**			
	19 common environments	**24.1a**		**20.4b**		
	17 common environments	**23.0a**			**17.9b**	
	6 common environments	**25.0a**				**25.2a**

*. Different letters indicate significant differences ($P \leq 0.05$) based on paired t-test.

†. Trials: GNPYT, Great Northern Preliminary Yield Trial, GNAYT, Great Northern Advanced Yield Trial, MVT, Miscellaneous Variety Trial, MRPN, Midwest Regional Performance Nursery.

Locations: HAT-Hatton, PRO-Prosper, FRR-Forest River, CAR-Carrington, JOH-Johnstown, COL-Fort Collins-CO, MIC-Saginaw-MI, NEB-Scottsbluff-NE.

Table 2. Other agronomic and quality characteristics of ND Pegasus compared with commercial cultivars commonly grown across 15 environments in the MIN-DAK region (2013-2018).

Genotype	100-seed Weight	Days to Flower	Days to Maturity	Plant Height	CBB†	Canning Quality‡
	g ± SD	d	d ± SD	cm ± SD	1-9 ± SD	1-7 ± SD
ND Pegasus	36.8 ± 4.2	40	103 ± 6	71 ± 7	7 ± 1	3.3 ± 1.1
Matterhorn	31.7 ± 3.1	39	98 ± 6	60 ± 7	8 ± 2	4.1 ± 1.5
Powderhorn	32.7 ± 2.6	39	94 ± 6	75 ± 4	8 ± 2	3.5 ± 1.7
Aries	35.2 ± 4.4	39	99 ± 5	40 ± 5	8 ± 2	4.3 ± 1.7

†. Common Bacterial Blight (*Xanthomonas axonopodis* pv. phaseoli) CIAT scale: 1-3=Resistant, 4-6=Intermediate, and 7-9=Susceptible. Data obtained from 4 locations only.

‡. Canning quality is a visual score where 1=unacceptable, 2=poor, 3-4=average, 5-6=above average, and 7=Excellent. Data obtained from 2 locations only.

Table 3. Other agronomic and quality characteristics of ND Pegasus compared with 'Taurus' commonly grown across 7 environments in the MIN-DAK region (2013-2018).

Genotype	100-seed Weight	Days to Maturity	Plant Height
	g ± SD	d ± SD	cm ± SD
ND Pegasus	38.2 ± 4.6	102 ± 4	60 ± 5
Taurus	37.4 ± 3.7	103 ± 5	55 ± 3

Table 4. White mold (*Sclerotinia sclerotiorum* Lib. De Bary) screening. Greenhouse results from 2017 White Mold National Nursery (WMMN) testing* at five states.

Line	NE	OR	WA	WI	CO	Mean	Grouping
P14814	7.5	8.3	7.9	6.5	7.5	7.6	A
N14229	7.3	7.9	6.3	5.5	7.8	7	A B
B15430	7.6	7	7.8	6.1	6.2	6.9	A B
PT9-5-6	7.5	6.9	6.1	6.3	7.5	6.9	A B C
Beryl	7.2	5.6	7.9	4.3	7.7	6.5	A B C D
SR16-5	7.1	7.6	5.8	4.7	7.2	6.5	A B C D
NDZ14083	7.2	6.6	6.1	4.8	6.4	6.2	B C D E
Cayenne	4.7	5.2	5.9	5.5	6.9	5.7	C D E
Bunsi	6.6	5.1	6.3	4.2	5.8	5.6	D E
ND Pegasus	**5.8**	**3.2**	**6.1**	**4**	**6.8**	**5.2**	**E F**
ND122386	4.4	5.3	3.8	3.5	4	4.2	F G
G122	5.2	2.8	3.8	4	4.6	4.1	F G
NE5-16-101	3.5	2.7	2.4	3.3	5.1	3.4	G
NE5-16-98	4	3.1	2.8	3.3	3	3.2	G

*Petzoldt & Dickson scale: 1-3 = resistant, 4-6 = intermediate, 7-9 = susceptible. Source: Higgins, R., Z. N. Kamvar, S.E. Everhart and J.R. Steadman. 2018. New sources of white mold resistance derived from wide crosses in common bean and evaluated in the greenhouse and field using multi-site screening nurseries comparing 2016 and 2017 data. Annu. Rept. Bean Improv. Coop. 61:157.158.