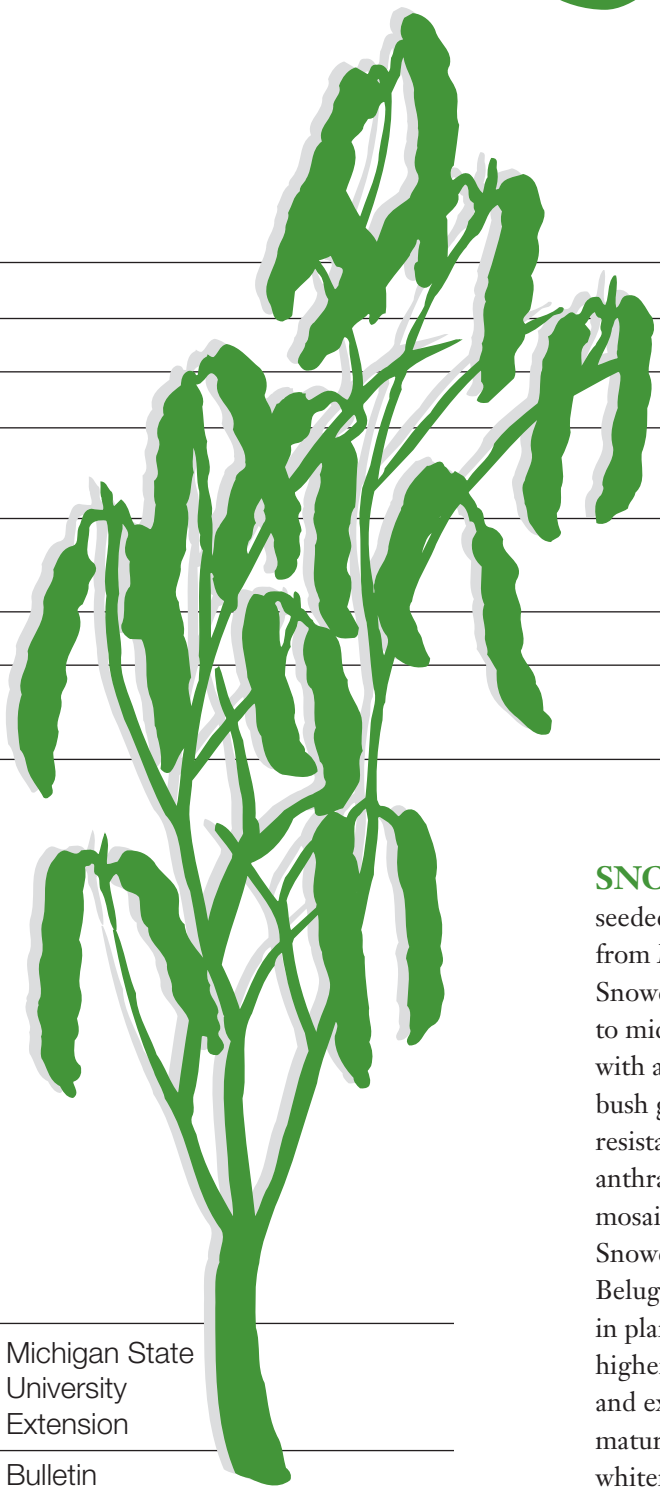
NEW from MSU

Snowdon

NEW WHITE KIDNEY BEAN *for Michigan*



- New high-yielding, early-season white kidney bean variety.
- Matures in 94 days, six days earlier than Beluga white kidney.
- Exhibits uniform maturity coupled with good dry-down.
- Resistant to strains of anthracnose, rust and mosaic virus common in Michigan.
- Best suited to irrigated production regions with coarse-textured, sandy loam soils.
- Large white seed size with acceptable canning quality.
- White kidney beans are also marketed as alubia or canellini beans.

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SNOWDON is a new large-seeded white kidney bean variety from Michigan State University. Snowdon is a high-yielding, early- to midseason-maturing variety with an upright, determinate bush growth habit. Snowdon is resistant to strains of bean rust, anthracnose and bean common mosaic virus present in Michigan. Snowdon most closely resembles Beluga white kidney bean variety in plant appearance, but it is higher yielding, matures earlier and exhibits better dry-down at maturity. The seed is larger and whiter than the seed of Beluga. Snowdon possesses acceptable canning quality equivalent to that of other white kidney bean varieties. In animal feeding trials, white kidney beans have been shown to possess the highest cancer amelioration properties among all bean seed types tested.

Origin and breeding history

Snowdon, tested as breeding line K08961, was developed as a high-yielding, earlier maturing white kidney bean variety with enhanced disease resistance and acceptable canning quality. Snowdon was developed from the cross K04604/USDK-CBB-15. The MSU breeding line K04604 was a high-yielding white kidney line with desirable agronomic traits, but

it lacked acceptable canning quality. The dark red kidney breeding line USDK-CBB-15 was released by the USDA-ARS program in Washington and possesses resistance to common bacterial blight combined with the superior agronomic and canning quality characteristics of Red Hawk dark red kidney bean variety. The purpose of the cross was to introduce improved canning quality from the red kidney to the white kidney seed class and retain desirable agronomic traits and disease resistance to common bacterial blight in high-yielding, erect white kidney beans. The cross, made in 2006, was advanced to the F_6 generation and was entered into yield trials in 2008 under the code number K08961.

Agronomic and disease information

Snowdon exhibits the type-I upright determinate bush growth habit combined with good resistance to lodging (score less than 2). Plants average 20 inches in height and resemble Beluga in overall appearance. Snowdon is white-flowered; plants flower in 36 days, four days earlier than Beluga. Snowdon is an early to midseason bean, maturing 94 days after planting (Table 2). The range in maturity is from 92 to103 days, depending on season and location. It matures six days earlier than Beluga and is equivalent to California Early Light Red Kidney (CELRK) in maturity. Snowdon has demonstrated the same uniform maturity and dry-down as CELRK. Unlike other commercial white and red kidney varieties, Snowdon does not exhibit the green stem and leaf retention problems common at maturity in current kidney bean varieties. It has a higher agronomic acceptance rating because of its upright habit, resistance to lodging, excellent pod load and uniform early dry-down.

Snowdon was tested for four years (2008-11) over 14 locations by MSU in cooperation with colleagues in Michigan. Over all 14 locations, Snowdon yielded 28.2 cwt/acre, significantly exceeding the yield of Beluga white kidney, Montcalm dark red kidney and CELRK cultivars. Snowdon outyielded Beluga by 5 cwt/acre over 11 locations. Yields of Beluga ranged from a high of 44.5 cwt/acre at the Montcalm Research Farm (MRF) in 2008 to a low of 14.6 cwt/acre in Bay County in 2009. Over the locations tested, Snowdon outyielded all the commercial control varieties by the margins shown in parentheses: Beluga (17 percent), Red Hawk DRK (8 percent), Montcalm DRK (13 percent), Chinook LRK (7 percent) and CELRK (13 percent). Over the four years, Snowdon ranked first in three tests and fourth in two kidney bean tests conducted at MRF and was also very competitive with current commercial red kidney bean varieties, outyielding Clouseau, Inferno and Pink Panther light red kidney varieties in 2011 (Table 1). Growers should follow current recommended practices for fertility and weed control in growing Snowdon beans, found at: **http://agbioresearch.msu.edu/saginawvalley/index.html; www.msuweeds.com**.

Snowdon possesses the single dominant hypersensitive I gene, which conditions resistance to seed-borne bean common mosaic virus (BCMV). Snowdon is resistant to race 73 of anthracnose but is susceptible to the less common race 7. Snowdon possesses resistance to some races of rust but is susceptible to rust race 22:2, now prevalent in Michigan. Snowdon exhibits similar reaction to white mold as other kidney bean varieties (Table 2). Over the four years of testing, Snowdon ranged from 21 percent to 61 percent white mold, with a mean of 35 percent in irrigated trials at MRF. Snowdon is susceptible to common bacterial blight and does not possess resistance levels present in the USDK-CBB-15 parent.

Quality characteristics

Snowdon has a typical large white kidney bean seed, averaging 65 g/100 seeds; size ranges from 60 to 72 g/100 seeds. The seed is larger in size than that of Beluga (54g) but is similar in shape and color. In canning trials, Snowdon was subjectively rated by a team of panelists as being acceptable in cooking quality. Snowdon rated 3.2 on a scale of 1 to 7, where 7 is best and 4 is midscale (neither acceptable nor unacceptable). Data on L-color (lightness scale) of cooked beans showed that Snowdon was lighter in color than Beluga, which is desirable. No differences were observed for hydration ratio. The texture of 29 kg/100g was softer than that of Beluga (43 kg), and values were slightly lower than the acceptable range of 45 to 75 kg/100 g for processed kidney beans, suggesting that the processing time or overnight soak used at MSU needs to be reduced for white kidney beans. This reflects the fact that white kidney beans are quicker cooking and therefore softer than red kidney beans. Within the commercial white kidney bean class, Snowdon was rated slightly lower than Beluga in appearance. Beluga demonstrates the best overall canning quality in the white kidney market class.

Release and research fee

Snowdon was released by Michigan State University with the option that Snowdon 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 production location. Plant variety protection (PVP) is anticipated. Parties interested in licensing Snowdon may contact MSU Technologies by phone at (517) 355-2186 or on the Internet at **http://technologies.msu.edu**.

Table 1. Comparison of yield and agronomic characteristics of Snowdon with 10 white and red kidney bean varieties grown in trial of 112 entries at Montcalm Research Farm in 2011.

Variety	Commercial kidney class	Rank of entries	Yield (cwt/acre)	100 seed weight (g)	Days to flower	Days to maturity
Snowdon	White	4	37.2	59.8	35	98
Clouseau	Light red	11	35.0	66.0	35	101
OAC Inferno	Light red	22	33.3	64.1	37	108
Majesty	Dark red	32	32.3	76.9	39	101
Pink Panther	Light red	38	32.0	62.5	35	101
Red Hawk	Dark red	48	31.3	54.7	35	102
CELRK	Light red	62	30.1	58.3	35	100
OAC Redstar	Dark red	88	27.8	57.9	36	102
Beluga	White	91	27.5	55.9	37	103
Chinook 2000	Light red	99	27.1	49.4	36	104
Montcalm	Dark red	100	26.9	59.7	38	102
Test mean	112 entries		30.5	56.4	35	104
$LSD_{0.05}$			6.5	4.6	1.6	2.7

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Table 2. Comparison of agronomic, disease and canning quality characteristics of Snowdon with other kidney bean varieties.

Varieties	Snowdon	Beluga	Red Hawk	Montcalm	Chinook	CELRK
Agronomic traits						
Days to flower	36	40	37	39	39	37
Days to maturity	94	100	98	102	101	94
Height (inches)	20	20	19	20	20	18
Lodging score	1.4	1.5	1.4	2.1	2.0	1.2
Agronomic index	5.0	4.3	4.4	4.0	4.0	3.9
100 seed weight (g)	65.2	54.4	53.7	56.6	51.9	61.9
Yield percent	100	83	92	87	93	87
Disease resistance traits						
BCMV	R	R	R	R	R	R
Anthracnose Race 73	R	R	R	R	R	R
Race 7	S	S	R	S	R	R
Rust Race 22:2	S	S	S	S	S	S
CBB	S	S	S	S	S	S
Percent white mold	21	17	24	30	27	9
Canning quality traits						
Color L-scale	54.8	50.8	—	—	—	—
Hydration ratio	2.3	2.3	—	—	—	—
Texture (kg)	29	43	—	—	—	—
Visual rating	3.2	3.5	4.6	3.7	3.4	3.2

Lodging: 1 = erect, 5 = prostrate; 100 seed weight – grams.

Agronomic Index: 1 = worst, 5 = average, 9 = excellent; texture – kg/100g canned beans.

Diseases: BCMV = bean common mosaic virus; CBB = common bacterial blight.

R = resistant, S = susceptible.

White mold: percent disease incidence and severity.

Visual rating: 1 = very undesirable, 4 = neither desirable nor undesirable, 7 = very desirable.

Produced by ANR Communications.