

REXETER NAVY BEAN

Rexeter is a full season maturity navy bean with good yield, good harvestability and resistance to bacterial blight



Variety	Yield lbs/ac ^{a*}	Maturity DAP ^{b*}	Suitability for Direct Harvest ^{c*}
Rexeter	3372	109	2.2
Lighthouse	3412	108	1.8
Mist	3390	109	1.7
Apex	3428	108	2.1
Medalist	3246	106	1.9
Mean	3370	108	1.9
LSD(0.05) ^{d*}	93		

*2013-2015 OPCC Performance data, 14 location years, Days to Maturity, Yield and Seed Weight are 3 year averages, Adapted from GoBeans.ca Infosheets.

^b To convert lbs/acre to t/ha divide by 893.

^a Days to Maturity after planting maturity. Maturity rating is affected by planting date and area where variety is being grown. Varieties are rated as mature when 95% of the pods are ripe. Normally, 3-10 additional drying days are needed before the crop is dry enough for combining.

^c Suitability for direct harvest (harvestability) is based on a scale of 1-5, where 1 = upright plant type, standing erect with good bottom pod height and 5 = more prostrate plant type that are not erect, with poor bottom pod height.

^d LSD (0.05) – the LSD is a measure of variability within a trial. There is a ninety five percent probability that yields that differ by an amount greater than the LSD are different. Yields that differ by an amount less or equal to the LSD should be considered the same.



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Developed by the University of Guelph Dry Bean Breeding Program.
http://www.plant.uoguelph.ca/research/bean_breeding/index.html
Pedigreed seed available from Hensall District Co-operative (HDC),
1 Davidson Drive, P.O. Box 219, Hensall ON N0M 1X0 Canada,
Phone: 519-262-3002, Fax: 519-262-2317

REXETER NAVY BEAN

Disease Reaction ^{a*}						
Variety	BCMV		Anthracnose ^b			Common Blight ^c
	Race		Race			
	1	15	17	23	73	
Rexeter	R	S	S	S	S	R
Fathom	R	R	NA	NA	R	R
Vigilant	R	S	S	S	S	NA
Lightning	R	R	S	S	S	S
Medalist	R	S	S	S	S	S
Mist	R	R	S	S	S	R
Lighthouse	R	R	NA	R	S	R
Apex	R	R	S	R	S	R
Bolt	R	R	S	S	R	S

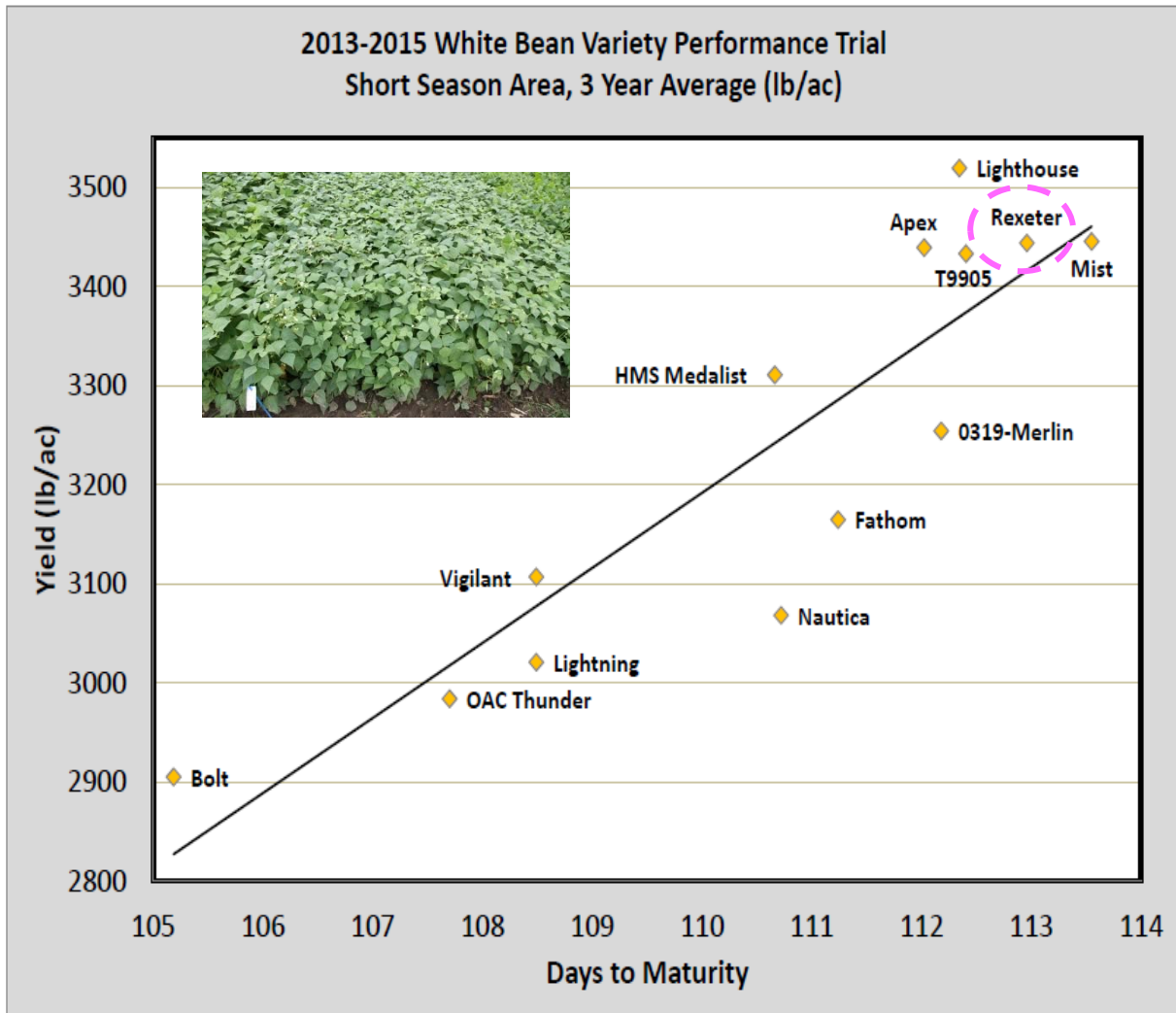
^a R = Resistant, S = Susceptible, NA = Not Available; * Adapted from GoBeans.ca Infosheets.

^b Anthracnose ratings, the predominant race found now in Ontario is Race 73. Race 17 (binary system) is equivalent to the Alpha race, race 23 (binary system) is equivalent to the Delta race.

^c Resistant to common bacterial blight (caused by *Xanthomonas campestris* pv. Phaseoli or *Xanthomonas axonopodis* pv. phaseoli). Very little disease will develop on varieties with a R rating.

REXETER NAVY BEAN

Yield vs Maturity Comparison *

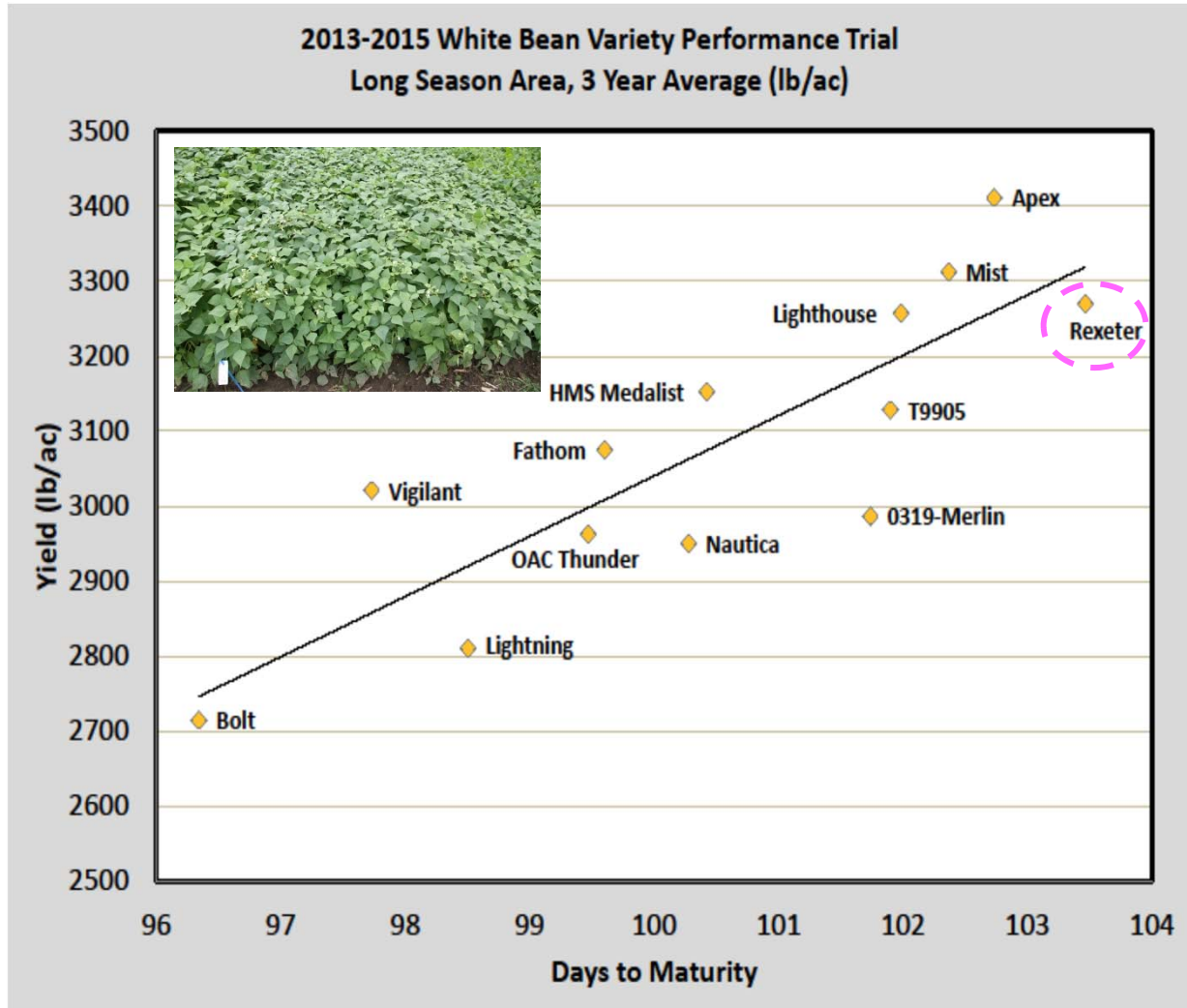


Data from 2013-2015 OPCC Performance Trials, 7 location years

* Adapted from GoBeans.ca Infosheets

REXETER NAVY BEAN

Yield vs Maturity Comparison*



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Rexeter common bean

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Smith, T. H., Michaels, T. E., Navabi, A. and Pauls, K. P. 2012. **Rexeter common bean**. *Can. J. Plant Sci.* **92**: 351–353. Rexeter common bean (CFIA registration no. 7019) is a full season maturity white bean (*Phaseolus vulgaris* L.) cultivar with an upright growth habit with excellent yield potential, resistance to common bacterial blight and acceptable cooking quality.

Key words: *Phaseolus vulgaris* L., white bean, common bean, cultivar description

Smith, T. H., Michaels, T. E., Navabi, A. et Pauls, K. P. 2012. **Rexeter common bean**. *Can. J. Plant Sci.* **92**: 351–353. Rexeter (CFIA registration no. 7019) est un cultivar nain de haricot blanc (*Phaseolus vulgaris* L.) à type de croissance indéfinie destiné aux régions recevant plus de 2600 unités thermiques de croissance.

Mots clés: *Phaseolus vulgaris* L., haricot blanc, haricot commun, description de cultivar

Rexeter is a white bean developed at the Department of Plant Agriculture, University of Guelph, Guelph, Ontario, Canada. The cultivar was registered by the Canadian Food Inspection Agency Cultivar Registration Office (Reg. no. 7019) on 2011 May 16. It is an upright, full season maturity cultivar with excellent yield potential, resistance to common bacterial blight and acceptable cooking quality. It is recommended for areas greater than 2600 crop heat units (CHU).

Pedigree and Breeding Methods

Rexeter was developed from the cross OAC Rex/AC Kippen made in growth room in 1999. OAC Rex (Michaels et al. 2006) was derived from the cross HR20-728/3/ICA Pijao/PI 440795/Ex Rico 23 and is resistant to common bacterial blight (CBB, caused by *Xanthomonas axonopodis* pv. *phaseoli*). HR20-728 is a selection from the cross Ex Rico 23/Midnight with upright plant architecture and a high podding canopy. ICA Pijao is a black bean released from the Instituto Colombiano Agropecuario (ICA), Colombia. PI 440795 is a *Phaseolus acutifolius* plant introduction line and was used in inter-specific crosses to introgress resistance to CBB into common bean (Parker 1985). Ex Rico 23 is a white bean from Centro Internacional de Agricultura Tropical (CIAT), Colombia. AC Kippen was selected from the cross HR40-1285/HR45-1445 at the Agriculture and Agri-Food Canada Greenhouse and Processing Crops Research Centre (AAFC GPCRC), Harrow, Ontario, Canada. HR40-1285 is derived from the cross Crestwood/HR14-818 and was used for its good canning quality and upright plant type derived from the

early-maturing semi-determinate upright germplasm HR14-818 (Park and Welacky 1992). HR45-1445 is CBB-resistant upright germplasm developed at AAFC GPCRC (Park and Dhanvantari 1994) from the cross HR13-621*2///XAN159/HR13-621.

The F₁ plants were grown in the field at the University of Guelph Elora Research Station (ERS), near Elora, Ontario, Canada in 2000 and were bulk harvested. A modified bulk method (a single pod was harvested from each individual and bulked) was used to advance the F₂ to F₄ generations. The F₂ generation was grown in a winter nursery in New Zealand. The F₃ and F₄ generations were grown at the ERS in the summers of 2001 and 2002. Single plant selections for early maturity, upright plant architecture, high pod number and high seed yield were performed on F₅ population bulk plots in the field at the ERS in 2003. The F₅ derived F₆ lines (F_{5;6}) were grown in 2004 at the ERS in progeny rows. The F_{5;7} selections were grown in preliminary yield trials at the ERS in 2005. Selected lines from the preliminary yield trials were tested in advanced yield trials in 2006 at the ERS and in a farmer's field near St. Thomas, Ontario, in collaboration with Dr. S. J. Park, AAFC GPCRC, Harrow. Selection criteria in the preliminary and advanced yield trials were the same agronomic traits as for the F₅ population.

Performance

Rexeter was entered into the Ontario Pulse Crop Committee's Registration and Performance Trials as OAC 07-2 in 2007, 2008 and 2009. Registration trials were valid in Kippen in 2007, four locations in 2008

Table 1. Average performance of Rexeter and check cultivars, AC Compass and OAC Thunder, tested in eight trials in the Ontario White Bean Cultivar Registration Trials^z in 2007–2009

Cultivar	Yield (kg ha ⁻¹)				Maturity (d)				Seed weight (g 100 seed ⁻¹)			
	2007	2008	2009	Mean ^y	2007	2008	2009	Mean ^y	2007	2008	2009	Mean ^y
Rexeter	3882	4122	3349	3802	98	106	110	107	21.0	19.8	19.5	19.8
AC Compass	2898	3617	2903	3259	88	94	99	95	21.7	20.6	20.7	20.7
OAC Thunder	3820	3556	3157	3439	97	98	105	100	23.4	20.7	21.1	21.2
SE ^x	57.2	53.1	55.1	46.4	0.7	0.9	0.9	0.8	0.30	0.27	0.26	0.25

^zTrials were conducted at Elora, Blyth and Kippen in 2009; St. Thomas, Kippen, Brussels and Elora in 2008; Kippen in 2007.

^yBased on total number of trials.

^xBased on trial means of 25 cultivars (not shown). Standard error of means, estimated in combined analysis over trials within each year and over years.

(Kippen, St. Thomas, Brussels and Elora) and three locations in 2009 (Kippen, Blyth and Elora). During 2007 and 2008, the line was also grown in seed increase plots at the ERS to produce F_{5:9} and F_{5:10} generations. One hundred single plants from the F_{5:11} generation, grown in a growth room in the winter of 2008–2009, were rogued for uniformity and trueness to type, and the seed from the remaining plants was bulked individually and planted in plant rows near Twin Falls, Idaho, USA, for breeder seed production in 2009.

Canned bean samples of cultivar Rexeter grown at three locations were assessed for appearance, flavour and texture by a panel at AAFC GPCRC, Harrow, Ontario. The texture of canned beans was evaluated mechanically with the Ottawa texture measurement system for firmness (N mm⁻¹) and plateau force (N) (Voisey 1971) with wire extrusion cells [Instron texture measurement system model 441 (Instron Corporation, Canton, MA)]. The degree of packing of canned beans was examined visually. The washed-drained weight of

the cooked samples was determined to quantify percent solid weight of each sample. The hydration coefficient was estimated as the water uptake of 1000 g of dry beans.

Rexeter has high yield potential. Its average yield over 3-yr trials was 3802 kg ha⁻¹, which was 16% (448 kg ha⁻¹) higher than the mean of 25 cultivars included in trials (not shown) and out-yielded both checks, OAC Thunder by 9% (363 kg ha⁻¹) and AC Compass by 14% (543 kg ha⁻¹) (Table 1). Seed weight (grams per 1000 seeds at 14% moisture) was 198 g, slightly lower than checks (Table 1). The cultivar matures in 107 d (3 yr mean), which is longer than checks, OAC Thunder (100) and AC Compass (95) (Table 1). Therefore, it is suitable for the short season regions in Ontario with over 2600 crop heat units (Brown and Bootsma 1997). Cooking quality of Rexeter is acceptable and similar to both OAC Thunder and AC Compass (Table 2).

Rexeter has resistance to CBB similar to OAC Rex (Michaels et al. 2006). Initial screening ratings were

Table 2. Cooking quality of canned beans and disease reaction of Rexeter and check cultivars, AC Compass and OAC Thunder, in the Ontario Pulse Crop Committee White Bean Cultivar Registration Trials^z (2008)

Cultivar	Cooking quality						Disease reaction			
	Panel ^y	Texture ^x		Packing ^w	Drainedry wt. ^v	Hydration Coefficient ^u	Disease reaction			
		Plateau force (N)	Firmness (N mm ⁻¹)				BCMVT ^t	Anthracnose ^s		
(1–15)			(1–5)	(%)	(%)	1	15	17	23	
Rexeter	8.5	366	28.2	2.7	68.0	1.83	–	+	+	+
AC Compass	8.7	346	20.7	2.0	64.9	1.89	+	+	–	–
OAC Thunder	8.9	363	27.8	2.3	66.8	1.83	+	+	–	–
SE ^r	0.12	10.0	1.03	0.10	0.46	0.008				

^zTrials were conducted at St. Thomas, Kippen and Elora.

^yEight panelists evaluated the appearance, flavour and texture of canned beans in tomato sauce using a scale of 1–15; 1, poor; 15, excellent.

^xTexture of washed-drained canned beans measured on Instron Texture measurement system using wire extrusion cells for plateau force (N) and firmness (N mm⁻¹).

^wDegree of clumping of canned beans scored visually from 1 to 5; 1, no clumping; 5, over half clumped.

^vDrained weight: weight of washed-drained canned beans expressed as a percentage of unwashed-undrained weight.

^uSoaked weight /dry weight (determined for 500 g of dry beans soaked for 40 min at 88°C).

^tResistance (–) or susceptibility (+) to bean common mosaic virus (BCMVT) races 1 and 15.

^sResistance (–) or susceptibility (+) to Anthracnose races 17 and 23.

^rBased on trial means of 20 cultivars.

taken in the field with natural infection in 2006 and 2008. Indoor tests, using artificial inoculation with the multiple-pin technique (Andrus 1948) were conducted in growth chambers in 2009. The inoculum was generated from leaves isolated from infected plants in the field using the dry leaf inoculum method (Gilbertson et al. 1988). Field testing was conducted in hill plots using the dry leaf inoculum method and a high pressure sprayer in 2010.

The cultivar is resistant to bean common mosaic virus (BCMV) race 1. The trials were conducted under controlled conditions in growth chambers at the AAFC GPCRC, Harrow, Ontario using plants with fully expanded unifoliate leaves (approximately 10 d old). Inoculum was maintained by harvesting seeds from infected plants and prepared from infected leaves by grinding them with a mortar and pestle and carborundum powder (Fisher Scientific, Pittsburgh, PA) in a 0.01 M phosphate buffer (pH 7.0). The upper surfaces of the unifoliate leaves were covered with the race 1 or race 15 inoculums. The leaves were allowed to dry and the plants were misted with water to enhance inoculum absorption. Inoculated plants were maintained in 23/18°C day/night temperature with a 14 h photoperiod. Disease ratings were performed 7–10 d after inoculation.

Rexeter is susceptible to anthracnose [caused by *Collectotrichum lindemuthianum* (Sacc. & Mangus)] races 17 (alpha) and 23 (delta). The trials were conducted under controlled conditions in growth chambers at the AAFC GPCRC, Harrow, Ontario. For each test 10–15 plants were inoculated by brushing both the upper and lower surfaces of the unifoliate leaves with a *C. lindemuthianum* suspension of 10^6 spores mL⁻¹, in Mathur's medium (0.1% yeast extract, 0.1% Bacto Peptone, 1% sucrose, 0.25% MgSO₄·7H₂O, 0.27% KH₂PO₄, 2% agar supplemented with 25 mg of ampicillin in 1 L of sterile distilled water). Inoculated plants were placed into a mist chamber with 100% humidity at 23°C for 48 h, and then transferred to a growth cabinet at 23/18°C day/night temperature with a 14 h photoperiod. Disease ratings were performed 5 d after inoculation and repeated 3 d later.

Other Characteristics

Rexeter has an upright indeterminate growth habit with a medium (30–50 cm) vine length and plant height at maturity of 50 cm. It has a green hypocotyl at the seedling stage and dark green leaf colour (measured at

time of full flowering) with small terminal leaflets. It has white flowers, which appear approximately 53 d after planting. The pod (measured when pod filling is complete, prior to yellowing) is short and narrow with slight curvature. At maturity, pods are tan in colour. The seed has a broad elliptic shape and a white seed coat colour with self-coloured seed hilum ring.

Maintenance and Distribution of Pedigreed Seed

Pedigreed breeder seed of the Rexeter is maintained by the University of Guelph, Department of Plant Agriculture, Guelph, Ontario, Canada N1G 2W1. Pedigreed seed will be distributed through Hensall District Co-operative, P.O. Box 219, Hensall, Ontario, Canada N0M 1X0 (telephone: 519–262-3002).

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