
COMPARISON OF ROOTING DEPTH IN *Phaseolus vulgaris* & *P. acutifolius*

Claire V. Thomas and J. Giles Waines
 Department of Botany and Plant Sciences
 University of California, Riverside, CA 92521

In field trials at Riverside, during the summers 1978 and 1979, tepary bean (*P. acutifolius*) lines were observed to grow and mature seed using stored soil moisture from winter rains and a single pre-irrigation with no subsequent irrigations. Common bean lines under the same treatment died. Of the California cultivars of common bean tested, 'Small White 53' proved to be the most drought resistant.

One cultivar of each species, Small White 53 and PI 321638 (a white-seeded tepary), was grown in 1.7 m tar-paper pots filled with UC soil mix to observe root characteristics. There was a total of 14 pots of each species. The soil in the pots was brought to field capacity and germinated seeds planted in the soil. No more water was added. The pots stood outside in full sun with a daily maximum air temperature from 32° to 43°C. The experiment began August 9, 1979 and lasted for 8 weeks. There was no rain during this time. At weeks 1, 2, 3, 4, 5, 6, and 8, two pots of each species were broken down and soil carefully washed away from the roots and the length measured. At every harvest date the mean length of the tepary roots exceeded that of common beans. By week 8, the tepary roots had reached the bottom of the pots (1.7 m), whereas the common bean roots had penetrated only half as far. Field trials are planned for summer, 1980, with more cultivars of both tepary and common bean, to study root behavior under field conditions.

INTERSPECIFIC HYBRIDIZATION BETWEEN
Phaseolus vulgaris AND *P. acutifolius*

Claire V. Thomas and J. Giles Waines
 Department of Botany and Plant Sciences
 University of California, Riverside, CA 92521

Tepary beans (*P. acutifolius* A. Gray) are far more heat and drought resistant than common beans (*P. vulgaris* L.). Teparies will grow and mature seed in the field during the summer at Riverside, CA with only 1 pre-irrigation, whereas under the same conditions common beans die. Plants of the two species were crossed at UCR during the last 2 years to transfer heat and drought resistance into common beans. Fifteen different bean and 22 tepary lines were crossed in many combinations. The *vulgaris* lines included 9 cultivars and 6 wild types: 2 wild x cultivar F₁ hybrids were also used as parents. Twelve tepary cvs. and 10 wild types (5 ssp. *latifolius*, 5 ssp. *tenuifolius*) were used. Embryos were cultured 2 weeks after pollination following the method of Mok *et al.* (1978) with no hormones included in the medium. Embryos were transferred to fresh medium at 7-14 day intervals until root and shoot development was judged adequate to transfer the plantlets to soil in pots. From ca. 1200 pollinations over 500 embryos were cultured, most of which did

Table 1. Common bean x Tepary F₁ hybrid plants in the greenhouse, February 1980.

Cross	No. Plants	Parents
L16 x PI319443	3	Masterpiece x white seeded tepary cv.
L16 x PI319446	6	Masterpiece x wild <u>latifolius</u> tepary
PI321638 x PI319441	2	White seeded tepary cv. x wild bean
L16 x L320	4	Masterpiece x wild <u>tenuifolius</u> tepary
PI321638 x (L83 x PI319441)	1	White seeded tepary cv. x F ₁ hybrid (Pinto UI114 x wild bean)
(L83 x PI319441) x PI319443	1	
PI319443 x L10	1	White seeded tepary cv. x wild bean
PI321638 x L13	1	White seeded tepary cv. x wild bean
L16 x PI321638	1	
PI321638 x L16	1	

Table 2. F₂ and BC₁ material from bean/teparay F₁ hybrids. The square brackets enclose the F₁ interspecific hybrid, which was always used as female parent in backcrosses.

	# embryos cultured	# plants in greenhouse	# plants with seeds	# plantlets still in tubes
F ₂				
[(L83x319441)x319443]	2	-	-	-
[321638x(L83x319441)]	1	-	-	1
[321638xL13]	3	-	-	3
[321638xL16]	1	-	-	1
[L16x319446]	1	-	-	1
BC ₁				
[L16x319446] xL16	1	-	-	-
[(L83x319441)x319443] xL16	10	5	2	1
[(L83x319441)x319443] x(319441xL85)	1	-	-	-
[L16xL320] xL16	1	-	-	-
[321638xL16] xL16	1	-	-	1
[321638x(L83x319441)] x(321638xL320)	2	2	1	-

P. vulgaris: L13 wild from Jalisco; L16 Masterpiece; L83 Pinto UI #114; L85 Sanilac; PI 319441 wild.

P. acutifolius: L320 wild ssp. tenuifolius; PI 319443 white flowered, white seeded cv.; PI 319446A, wild latifolius; PI 321638 white flowered, white seeded cv.

not grow. Many grew for a while in culture and then died. Others were lost when transplanted to soil; others turned out to be selfed maternal plants. The cross was successful in both directions. A total of 21 F₁ hybrid plants was raised to maturity, all of which are highly sterile (Table 1). The cv. Masterpiece (Evans, Cambridge, U.K.) was the bean parent in 15 F₁ hybrids. Six hybrids produced either F₂ seed or BC₁ seed, embryos of which were also cultured. Seven BC₁ plants are currently flowering in the greenhouse and 4 have set selfed seed some of which is already mature. Backcrossing to commercial California cultivars will continue and progeny should be ready to field test this summer. Cuttings of F₁ and later generations are easily rooted under mist.

Reference

Mok, D.W.S., M.C. Mok and A. Rabakoarihanta. 1978. Interspecific hybridization of Phaseolus vulgaris with P. lunatus and P. acutifolius. Theor. and Appl. Gen. V. 52:209-215.

A BUSH GREEN BEAN MUTANT WITH DARK GREEN BLISTERED LEAVES

A. F. Coertze
Horticultural Research Institute, Private bag X293
Pretoria, 0001, Republic of South Africa

A healthy plant with dark green blistered leaves was discovered in a bush bean breeding line at Roodeplaar near Pretoria a few years ago.

It is not sure if this mutant corresponds to one or other ancestor or if it is completely new. If it is new, it might be valuable as germplasm.

The possible values of 265/61-1-1 are:

1. A distinctive leaf type.
2. A more or less upright leaf orientation possibly suitable for high density planting.
3. As the leaves seem to be tough it is expected to have some resistance to certain insects.
4. In addition, it showed tolerance to halo blight and rust.

In a cross with a bean with normal leaves, a 3(normal):1 (dark green blistered) segregation pattern was found in the F₂.

Trial seed samples are available on request and any comment will be appreciated.