

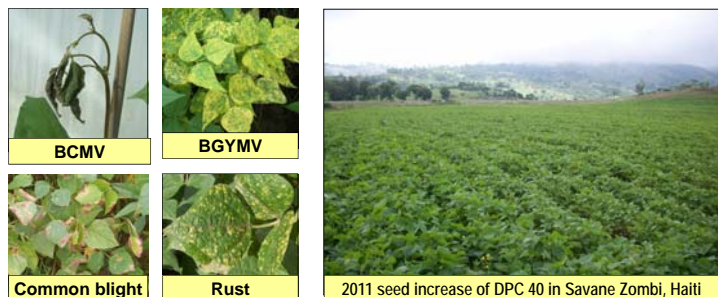
Common bean improvement in the Caribbean



James Beaver¹, Mildred Zapata¹, Myrna Alameda¹, Timothy Porch², Juan Carlos Rosas³, Graciela Godoy-Lutz⁴ y Emmanuel Prophete⁵



¹Depto. de Cultivos y Ciencias Agro-Ambientales, Univ. de Puerto Rico Mayagüez, PR 00681; ²USDA-ARS Tropical Agriculture Research Station, Mayagüez, PR 00680; ³Carrera de Ciencia y Producción, Escuela Agrícola Panamericana, Apartado Postal 93, Tegucigalpa, Honduras, ⁴Instituto Dominicano de Investigaciones Agropecuarias y Forestales, Santo Domingo, República Dominicana; y ⁵National Seed Service, Ministry of Agriculture, Port au Prince, Haití



The common bean is an important component of the traditional diet and the principal source of protein for low income families in the Caribbean. The seed types preferred by consumers varies among countries (Table 1). Haiti, the Dominican Republic and Cuba are the largest producers of beans in the region.

Diseases that limit bean yield in the Caribbean include Bean Golden Yellow Mosaic Virus (BGYMV), Bean Common Mosaic Virus (BCMV), Bean Common Mosaic Necrosis Virus (BCMN), rust caused by *Uromyces appendiculatus*, common bacterial blight *Xanthomonas axonopodis* pv. *phaseoli*, web blight caused by *Thanatephorus cucumeris* and root and stem rots caused by *Rhizoctonia solani*, *Fusarium solani* y *Macrophomina phaseolina*. The principal pests include leafhoppers (*Empoasca kraemeri*), leaf beetles (*Cerotoma* spp.), lepidoptera (*Hedylepta indicata*, *Etiella zinckenella*) and bruchids (*Acanthoscelides obtectus* and *Zabrotes subfasciatus*). Drought, high temperature and low soil fertility are abiotic factors that limit bean production in the region. The high cost of inputs, poor roads that limit access to markets and competition from imported beans are socio-economic factors that threaten local production of beans.

With support from the Bean/Cowpea CRSP and, in recent years, the Dry Grain Pulse CRSP, bean researchers at the Escuela Agrícola Panamericana (Zamorano), the Universities of Puerto Rico (UPR) and Nebraska and the USDA-ARS have collaborated with CIAT, the Instituto Dominicano de Investigaciones Agropecuarias y Forestales (IDIAF) and the National Seed Service of the Ministry of Agriculture of the Republic of Haiti to develop and release bean cultivars and improved germplasm for the Caribbean (Beaver et al., 2003) The focus of bean breeding activities has been the development of adapted cultivars having a preferred seed type and enhanced levels of disease resistance (Table 2). Several of the bean cultivars developed and released from this collaboration have gained wide acceptance in the Caribbean. 'Arroyo Loro Negro', 'Aifi Wuriti' and 'DPC 40' are popular black bean cultivars in Haiti and the Dominican Republic. The red mottled cultivars released by IDIAF are widely grown in the Dominican Republic. The BGYMV resistant white beans 'Verano' and 'Morales' are the predominant cultivars in Puerto Rico. Advanced breeding lines currently being developed and tested should produce cultivars with new seed types (yellow), resistance to additional diseases and pests (BCMN, bruchids) and tolerance to abiotic stress (drought and low soil fertility).

References

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Table 1. Bean production in the Caribbean.

Country	Area of production (ha)	Production (MT)	Seed yield (kg/ha)	Preferred seed types
Cuba	110,000	130,000	1,182	Black, red mottled and white
Dominican Republic	40,402	32,725	810	Red mottled, black, cranberry, white
Haití	53,000	33,000	623	Black, red mottled, yellow, white, pinto
Jamaica	220	230	1,045	Pink striped, light red kidney
Puerto Rico	400	1,050	2,500 (green shelled)	White, pink, pinto, light red kidney
Caribbean	202,906	189,941		

Table 2. Cultivars and improved germplasm developed by Zamorano, the UPR, the USDA-ARS and Caribbean bean breeding programs.

Name (year of release)	Seed type	Institution	Characteristics
PR0737-1 (advanced line)	Red mottled	UPR y USDA-ARS	Resistance to BGYMV (<i>bgm</i>), BCMV, BCMNV (<i>bc-3</i>)
XRAV-40-4 (advanced line)	Black	EAP,Haiti, IDIAF, UPR, UNL	Resistance to BGYMV (<i>bgm</i>), BCMV, BCMNV (<i>bc-3</i>), precosidad
Beniquez (2011)	White	UPR y USDA-ARS	Resistance to BGYMV (<i>bgm</i>), BCMV (<i>l</i>) BCMNV (<i>bc-3</i>)
Badillo (2009)	Light red kidney	UPR y USDA-ARS	Resistance to BCMV (<i>bgm</i>), CBB and heat tolerance
Aifi Wuriti (2008)	Black	EAP, Haiti	Resistance to BGYMV (<i>bgm</i>), BCMV (<i>l</i>), tolerance to low soil fertility and drought and earliness
Verano (2008)	White	UPR y USDA-ARS	Resistance to BGYMV (<i>bgm</i>), BCMV, CBB and heat tolerance
DPC-40 (2007)	Black	IDIAF, UPR y UNL	Resistance to BGYMV (<i>bgm</i>), BCMV (<i>l</i>) BCMNV (<i>bc-3</i>)
PR9745-232 and RMC-3 (2006)	Red mottled	CIAT, UPR, IDIAF, Haiti	Resistance to BGYMV (<i>bgm</i>) and BCMV (<i>l</i>)
PR0247-49 (2005)	Black	UPR y USDA-ARS	Resistance to BGYMV (<i>bgm-3</i>) and BCMV (<i>l</i>)
Arroyo Loro Negro (2000)	Black	IDIAF, UPR y UNL	Greater yield potential, <i>l</i> gene
JB-178 (2000)	Red mottled	IDIAF, UPR y UNL	Commercial grain type, rust resistance
PC-50 (2000)	Red mottled	IDIAF, UPR y UNL	Resistance to rust (<i>Ur-9</i> , <i>Ur-12</i>).
Morales (1999)	White	UPR y USDA-ARS	Resistance to BGYMV, BCMV and leafhoppers