

## Evaluation of new blueberry varieties cultivated in Xicotepec

### Evaluación de nuevas variedades arándano cultivadas en Xicotepec

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#### Abstract

In this study five cultivars of blueberry were evaluated for their performance and quality of fruit. The Biloxi, Legacy, Mystic, Sharpe blue and Ashei (control) cultivars were grown in the experimental orchard of the Technical University of Xicotepec Contribution. The experiment was evaluated using a simple ANOVA and Tukey test at  $P \leq 0.05$  detecting significant differences in study variables. The Biloxi (1.88 kg / plant) and Sharpe blue (1.67 kg / plant) cultivars had higher yields. Respect to physical parameters, the fruit of the cultivar Sharpeblue was superior in weight (2.5 g / fruit), nominal diameter (13.9 mm) and distal diameter (8.6 mm). According to chemical parameters, Mystic (pH = 3.16) is the acid variety; Ashley (pH = 3.46) and Legacy (pH = 3.37) are less acidic cultivars. The Total Dissolved Solids of all cultivars are between 10.2-11.8 ° Brix. The study found that Biloxi and Sharpeblue cultivars have better yield and quality of fruit.

#### Blueberry, yield, fruit quality

#### Resumen

En el presente estudio se evaluaron cinco variedades de arándano en base a su rendimiento y calidad de fruto. Las variedades Biloxi, Legacy, Mystic, Sharpeblue y Ashei (testigo) se cultivaron en el huerto experimental de la Universidad Tecnológica de Xicotepec. El experimento se evaluó aplicando un anova simple y una prueba de Tukey a  $P < 0.05$ , detectando diferencias significativas en las variables de estudio. Las variedades Biloxi (1.88 kg/planta) y Sharpe blue (1.67 kg/planta) mostraron mayores rendimientos. En cuanto a los parámetros físicos, el fruto de la variedad Sharpe blue fue superior en peso (2,5 g/fruto), diámetro nominal (13,9 mm) y diámetro distal (8,6 mm). Según los parámetros químicos, Mystic (pH=3,16) es una variedad ácida; Ashley (pH=3,46) y Legacy (pH=3,37) son variedades menos ácidas. Los sólidos totales disueltos de todas las variedades están entre 10,2-11,8 ° Brix. En el estudio se encontró que las variedades Biloxi y Sharpe blue tienen mejor rendimiento y calidad de fruta.

#### Arándano, rendimiento, calidad de la fruta

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## Introduction

The Blueberry (*Vaccinium* sp) is a dark, bluish or reddish berry, rich in antioxidants, which, due to its nutritional contribution, prevent skin cancer (Brooklyn BG, 2001).

The black or American varieties (*V. corymbosum* L) have blue-black fruit characteristics, are the richest in vitamin C, proliferate on shrubs that grow on acid soils and on high ground (Lyrene, 1990).

In 2013, the blueberry production in Mexico was 10,160 tons in an area of 1,290 ha, registering an average of 7.8 tons/ha. The states with the highest production were Jalisco, Colima, Baja California, Michoacán and Puebla (SIAP, 2015).

Ubicación	Sup. Sembrada (Ha)	Sup. Cosechada (Ha)	Producción (Ton)	Rendimiento (Ton/Ha)
Baja California	80	80	1,206.40	15.08
Colima	214.5	213	1,736.00	8.15
Jalisco	611	557	5,192.40	9.32
Michoacán	182	132	912	6.91
México	13	11	11.7	1.06
Puebla	286	166	843	5.08
Sinaloa	97	97	242.5	2.5
Sonora	34	34	16.32	0.48
	1,517.50	1,290.00	10,160.32	7.88

**Table 1** Blueberry Production in Mexico. Cycle 2013

In the state of Puebla, the municipalities that register production are Zacatlán, Huachinango and Hueyapan. The *Vaccinium ashei* (Rabbit Eye) variety is predominant and has a proven adaptation process in the region, but it has limitations in its cultivation that are reflected in production yields of 5.08 ton/ha lower than the national average (SIAP, 2015).

Municipio	Sup. Sembrada (Ha)	Sup. Cosechada (Ha)	Producción (Ton)	Rendimiento (Ton/Ha)
Huachinango	14	14	182.00	13
Hueyapan	10	0	0.00	0
Zacatlán	262	152	661.00	4.35
	286	166	843	5.08

**Table 2** Blueberry Production in Puebla, Cycle 2013

One technological option for producers is to introduce new varieties that are free of production and marketing rights. Some of these are the Biloxi, Legacy, Mystic and Sharp blue varieties.

Therefore, the objective of this work was to evaluate the yield and fruit quality of Biloxi, Legacy, Mystic, Sharpe blue and Ashei varieties grown in a cultivation system with irrigation and mulch.

## Methodology

The work was carried out by establishing an Experimental Garden, located in the facilities of the Technological University of Xicotepec de Juárez, at Avenida Universidad Tecnológica 1000, Col Tierra Negra, Xicotepec, Puebla, México. Xicotepec de Juárez is at 1,050 meters above sea level, with a climate of (A)Cb(fm)(e)gw” semi-warm humid with rain all year; and a rainfall of 3,058 mm per year. The type of soil in the orchard is humic acrisol, with a high content of organic matter and pH 5.2. Figure 1.



**Figure 1** Blueberry Orchard in UTXJ

Five blueberry varieties were established under a mulch cultivation system with irrigation, planting density of 3320 plants/ha, distance of 1.2 m between plants and 2.5 m between beds. The evaluation corresponds to the 2014 production cycle. The genotypes were evaluated under a simple variance analysis design with 10 repetitions.

The harvest corresponds to the second year of production. The parameter that was determined was fruit yield per plant/ha, estimated yield per ha and months of harvest. The physical characteristics determined are fruit weight (g) with the Ohaus digital scale, equatorial diameter (mm) and distal diameter (mm) with vernier. The chemical characteristics that were determined were hydrogen potential (pH), titratable acidity in citric acid (%), Total Dissolved Solutes (° Brix) with methods 981.12, 923.09C and 932.14 of the AOAC (1995). Humidity (%) Ohaus thermobalance method. The analysis of variance was applied with the SAS 9.1 software, performing a comparison of means by the Tukey method at  $\alpha=0.05$ .

## Results

The results indicate significant differences between varieties at  $P \leq 0.05$ . The Biloxi, Sharpe Blue and Legacy varieties are the most outstanding in terms of fruit yield, higher than the national average reported in SIAP (2015). The Ashei variety presents a premature harvest period in the month of June; the Mystic and Legacy varieties are considered to have an intermediate harvest period from July to August and the Biloxi and Sharpe blue varieties correspond to a broader and later harvest period from August to November. See table 1.

Cuadro 1. Rendimiento de Variedades de Arándano.

Variedad	Rendimiento (kg/Planta)	Rendimiento (kg/Ha)	Meses de Cosecha **	Mes de Máxima Cosecha **
Biloxi	1.890a*	6053.6	Junio-Octubre	Agosto
Sharpe blue	1.673b	5387.1	Agosto-Noviembre	Septiembre
Mystic	1.354d	4359.9	Julio-Agosto	Julio
Legacy	1.497c	4820.3	Julio-Agosto	Agosto
Ashei (Ojo de Conejo)	1.256d	4044.3	Mayo-Junio	Junio
Media	1.532	4902.4	Mayo-Noviembre	Julio
DMS	0.39			
CV (%)	2.09			

\*Letras diferentes indican diferencia significativa de Tukey a  $P \leq 0.05$ . Diferencia Mínima Significativa (DMS) Coeficiente de Variación (CV). \*\*Meses Observados de manera cualitativa.

On the other hand, the Biloxi and Sharpe blue varieties showed better characteristics of weight, equatorial and distal diameter of the fruit, which coincides with Sharpe and Sherman (1976). The diameter gauges above 11 mm are the best quality. See table 2.

Cuadro 2. Características físicas del Fruto.

Variedad	Peso (g)	Diámetro Ecuatorial (mm)	Diámetro Distal (mm)
Biloxi	2.053b	13.04b	7.592b
Sharpe blue	2.517a	13.90a	8.609a
Mystic	0.941d	9.51d	5.128d
Legacy	1.283c	11.36c	6.039c
Ashei (Ojo de Conejo)	1.069d	9.95d	5.385d
Media	1.572	11.6	6.550
DMS	0.153	0.562	0.269
CV (%)	7.655	3.8306	3.225

\*Letras diferentes indican diferencia significativa de Tukey a  $P \leq 0.05$ . Diferencia Mínima Significativa (DMS) Coeficiente de Variación (CV).

Regarding pH and Acidity, the most acidic variety is Mystic and the less acidic varieties are Ashei and Legacy with a pH of 3.46 and 3.37 respectively.

The STD in all the samples comply with the requirements in the quality interval of 10-14° Brix, recommended in the export standard of the US Federal Code of Regulations in the US. No.1. according to Spierts et. to the. (2002). Moisture content is similar in all varieties.

Cuadro 3. Características químicas del Fruto.

Variedad	pH	Acidez Titulable (%)	Sólidos Totales Disueltos (°Brix)	Humedad (%)
Biloxi	3.223d	0.52c	11.3b	86.9a
Sharpe blue	3.332c	0.58b	11.6a	87.4a
Mystic	3.136e	0.68a	10.2c	84.3b
Legacy	3.375b	0.56b	11.7a	86.6a
Ashei (Ojo de Conejo)	3.459a	0.48c	11.8a	85.7a
Media	3.305	0.56	11.3	86.18
DMS	0.041	0.012	0.128	0.897
CV (%)	1.383	4.82	0.885	1.23

\*Letras diferentes indican diferencia significativa de Tukey a  $P \leq 0.05$ . Diferencia Mínima Significativa (DMS). Coeficiente de Variación (CV).

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## Conclusions

The Biloxi, Sharpe blue and Legacy varieties have better fruit yield characteristics than the Ashei variety (rabbit's eye).

The intercropping of the Ashei variety (Rabbit Eye) with the Biloxi and Sharpe blue varieties allows the harvest to be carried out over a range of months from May to November.

Regarding the physical characteristics associated with a larger fruit size, the Sharpe blue and Biloxi varieties have a larger caliber.

Regarding STD and titratable acidity, Ashei (rabbit eye), Sharpe blue and Biloxi varieties are characterized as slightly acid sweet varieties.

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