



## Determination Of Some Traits Of Different Tomatillo Genotypes (*Physalis Ixocarpa Brot.*) Under The Çanakkale Conditions

Yalçın Coşkun

Canakkale Onsekiz Mart University, Vocational College of Lapseki, Canakkale, Turkey

ABSTRACT

Five tomatillo (*Physalis ixocarpa Brot. ex Hornem*) cultivars available from commercial seed companies (Amarylla tomatillo, Yellow tomatillo, Cisneros tomatillo, Purple tomatillo and Purple de milpa) and two populations (Macula tomatillo and Macula de milpa) were grown at the field of Çanakkale Onsekiz Mart University Lapseki Vocational College in 2013. Field trials were performed by randomized block design with three replications. Data were collected about of leaf area index, diameter of fruit and seed number per fruit for each genotype. Some morphological characteristics were also observed. There were statistically significant differences between tomatillo genotypes for all three traits. Leaf area index varied from 5.55 to 23.0 cm<sup>2</sup>. Diameter of fruit varied from 1.80 to 4.23 cm. Seed number per fruit varied from 247.33 to 525.66. Seed number per fruit values of Cisneros tomatillo, Amarylla tomatillo and Macula tomatillo were higher than others. Yellow tomatillo and Cisneros tomatillo that have high leaf area index values shall achieve high yield in Çanakkale ecological conditions.

## KEYWORDS

Tomatillo, leaf area index, diameter of fruit, seed number

## 1. INTRODUCTION

Tomatillo or husk tomato (*Physalis ixocarpa Brot. ex Hornem*) is a species native to Mexico and Central America and it is one of the most important vegetable crops in Mexico (Cantwell et al. 1992). Tomatillos resemble the beautiful orange Chinese lantern plant which is a close relative. Peeling back the husk of tomatillos reveals a green, yellow or purplish seedy solid fruit that tastes either sweet or tangy depending on the chosen variety. The bush reaches heights of 18 to 48 inches. The fruit should not be harvested until the husks become tan-colored and drop from the plant. The pulp of certain varieties of tomatillos is used for jams, pies, and salsas. All types of husk tomatoes cultivate well in similar growing conditions to those required for a regular garden variety tomato (Anonymous, 2016a). The husk tomato (*Physalis ixocarpa Brot.*) is a pre-Hispanic crop with an important place within the modern day vegetables produced in Mexico due to its use in the preparation of diverse dishes. The husk tomato is also grown for medicinal and craft purposes, mainly in the central portion of the country. Most of the production is destined for fresh consumption in the domestic market (Lopez-Lopez et al. 2014). Besides Mexico, tomatillo is grown in Guatemala, Colombia (Bukasov 1963), Poland, Russia (Bock et al. 1995), Southeast United States, Israel, and South Africa (Peña and Márquez 1990), the Rajasthan region in India, Australia, Kenya, Africa, Bahamas, Puerto Rico, Jamaica, England and Taiwan (Morton 1987). The most important countries, after Mexico, in the cultivation of this species are New Zealand, Australia, Africa, Kenya and India (Fisher et al., 1990). There is wide genetic variability in the tomatillo (Santiaguillo et al. 2004). The tomatillo is vigorous annual plant, spreading or erect in habit (0.3-1 m in height (Cantwell et al. 1992). Husk tomatoes usually do not ripen fully until after falling from the plant. Larger tomatillos need to get pulled from the plants. Ground cherries ripen from green to yellow-gold. Most tomatillos ripen from green to yellow-green to pale yellow (Anonymous 2016b). The Mexican husk tomato is subject to few pests and diseases. In Mexico, the main pest is the so-called *mosquita blanca*. The larvae of *Heliothis virescens* attack the fruits. It has been found that various species of *Trichogramma* parasitize the eggs, found mainly on the underside of the leaves, though only in certain localities at certain seasons. In India, fruit and stem borers are troublesome during the rainy season but

not in the winter. No insects attacked the plant in Puerto Rico. The two trials in Florida were at first promising, the plants flowering and setting fruit satisfactorily. However, as the fruits began to mature, they were attacked within the husk by a species of cutworm and only a few mature fruits were harvested. In Jamaica, seeds planted in late January produced vigorous and precocious plants which flowered when only 4 in (10 cm) high. Fruit-setting began in May and a high yield was expected but nearly all of the fruits were damaged by caterpillars before reaching maturity (Anonymous 2016c). The diversity in husk tomato diploid populations can be significantly increased with the development of autotetraploids which may then be used to carry out a proper selection process and develop populations with higher yields by taking advance of their higher genetic variability (Godina et al. 2013). Another species of *Physalis* that is *Physalis peruviana* has a wide range of usage area, which is rich in terms of vitamins and minerals and important for the pharmaceutical industry and commercially valuable is increased, then Turkey shall be provided to take place in foreign market as well as domestic consumption (Özdemir and Günel 2012). The aim of this research is investigation that is it possible to adapt of tomatillo to ecological conditions of Çanakkale. The Mediterranean climate occurs characteristically in Çanakkale.

## 2. MATERIAL and METHOD

The present study was conducted in 2013 at experimental field of Lapseki Vocational College of Çanakkale Onsekiz Mart University in Türkiye. Five tomatillo (*Physalis ixocarpa Brot.*) cultivars available from commercial seed companies (Amarylla tomatillo, Yellow tomatillo, Cisneros tomatillo, Purple tomatillo and Purple de milpa) and two populations (Macula tomatillo and Macula de milpa) were used as plant material of the study.

Çanakkale has a typical Mediterranean climate (Turkes et al. 2002). Long-term average rainfall is 629 mm and the average annual temperature is 14.9 °C in the region (Anonymous 2008). More than half of Çanakkale soils are covered with lime-free brown forest soils. The second group is brown forest soils that rather common found on both sides of the Dardanelles and in Gökçeada (Dizdar 2003).

Experiments were conducted in randomized plots design with 3 replications. Seedlings were grown from seed

during months of the March and April. Eight seedlings were planting per plot in 01 May 2013. Irrigation was made by drip irrigation system. Neither fertilizer nor pesticides was applied. Measurements were made for four plants per plot in November. Plants had died by frost in December. Data were collected about of leaf area index, diameter of fruit and seed number per fruit for each genotype. And also some morphological characteristics as plant height and plant growing form were observed.

Resultant data were subjected to variance analysis with JMP 5 statistical software and treatments means were compared with Student's t test.

### 3. RESULTS and DISCUSSION

Variance analyses revealed that genotypes had significant effects on leaf area index, diameter of fruit and seed number per plant ( $p < 0.05$ ). Mean groupings of Student's t test are provided in Table 1.

Leaf area index varied from 5.55 to 23.0  $\text{cm}^2$  by the genotypes. Diameter of fruit varied from 1.80 to 4.23 cm. Seed number per fruit varied from 247.33 to 525.66 by the genotypes (Table 1).

**Table 1. Student's t groups of leaf area index, diameter of fruit and seed number per fruit by genotypes**

Genotype	Leaf area index ( $\text{cm}^2$ )	Diameter of fruit (cm)	Seed number per fruit
Yellow tomatillo	23.07 a*	2.90 c	398.33 b
Cisneros tomatillo	21.77 ab	4.23 a	427.33 ab
Amarylla tomatillo	17.18 bc	4.00 a	525.66 a
Purple tomatillo	13.50 c	3.50 b	366.66 bc
Macula de milpa	7.18 d	2.00 d	276.00 c
Macula tomatillo	7.06 d	2.96 c	405.66 ab
Purple de milpa	5.55 d	1.80 d	247.33 c

\*: Levels not connected by same letter at same column are significantly different  $\alpha=0.05$  level.

Leaf area index values of Yellow tomatillo and Cisneros tomatillo were higher than others. Purple de milpa had lowest leaf area index value. Leaf area index is an important criterion for photosynthetic efficiency. Yellow tomatillo and Cisneros tomatillo that have high leaf area index values shall achieve high yield in Çanakkale ecological conditions.

Diameter of fruit values of Cisneros tomatillo and Amarylla tomatillo were higher than others. Purple de milpa had lowest diameter of fruit value. High diameter of fruit value is important for fresh consumption of tomatillo. Then Amarylla tomatillo and Cisneros tomatillo may be preferred fresh consumption by customers. Low diameter of fruit value is important for make jam, marmalade, sweetmeat and syrup. Then Macula de milpa, Purple de milpa may be preferred for these products.

Seed number per fruit values of Cisneros tomatillo, Amarylla tomatillo and Macula tomatillo were higher than others. Purple de milpa had lowest seed number per fruit value. Seed number per fruit value is not important for fresh consumption but is important for make jam, marmalade, sweetmeat and syrup. Then Purple de milpa may be preferred for these products.

Other measured or observed traits are given in Table 2. Plant height varied from 75 (Macula de milpa) to 182 (Amarylla tomatillo) cm. Plants were either erect or leaying in habit. Peduncles contained anthocyanin all genotypes. Our findings are similar to some researchers (Cantwell et al. 1992, Bock et al. 1995, Santiaguillo et al. 2004, Godina et al. 2013).

**Table 2. Some morphological characteristics of investigated genotypes of tomatillo**

Genotype	Plant height (cm)	Plant growth form
Amarylla tomatillo	182	Leaying
Yellow tomatillo	161	Leaying
Cisneros tomatillo	128	Leaying
Purple tomatillo	120	Erect
Purple de milpa	85	Erect
Macula tomatillo	116	Erect
Macula de milpa	75	Erect

Photographs about fruit and flower of tomatillo genotypes were given Figure 1-7. It is obvious that all genotypes have different fruit colors.



Figure 1. Yellow Tomatillo



Figure 2. Amarilla Tomatillo



Figure 3. Purple de Milpa Tomatillo



Figure 4. Cisneros Tomatillo



Figure 5. Macula de Milpa Tomatillo



Figure 6. Purple Tomatillo



Figure 7. Macula Tomatillo

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