

Characterization and field performance of two strawberry cultivars under Moroccan conditions

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Abstract— This work aims to study some agronomic parameters on strawberry cultivars installed at the experimental field of Larache, National Institute of Agricultural Research of Tangier, Morocco. The study was carried out on two cultivars of strawberry Fortuna and Victory. The results showed that the Victory cultivar (11.85Kg / plant) had a better yield compared to the cultivar Fortuna (5.26Kg / plant). The sugar level between the different stages increased to 2.7% for Victory and 2.62% for Fortuna in the red stage $\frac{3}{4}$ and then decreased to 2.5 for both varieties. The Victory cultivar showed greater leaf area and higher average stomatal conductance compared to the Fortuna cultivar, while the Fortuna cultivar showed higher chlorophyll content compared to the Victory cultivar.

Keyword— Strawberry, Fortuna cv, Victory cv, Moroccan condition.

I. INTRODUCTION

Strawberries (*Fragaria x ananassa Duch.*) are widely grown fruit crop in the world, adapted in geographically diverse area [1]. Strawberry varieties which widely consumed and desired by the people community is a sweet, brightly colored, and large of strawberry variety. The methods for determination of strawberry phylogenetic relationships is based on morphological and anatomical characters [2]. Variations in the strawberry plant are among the advantages of the plant, making it possible to create plant hybrids affected by the close phylogenetic relationships of several phenotypic appearances [3].

In Morocco, The strawberry sector has experienced continuous development in the northern zone of Morocco, mainly at the Loukkos perimeter. This development has been favored by the proximity of Europe, the availability of land, water and labor. The areas cultivated as well as the production have evolved significantly from 750ha with 31.00 T harvested in 1995 to 3500 ha on average in recent years with a production of 140 000 T before falling to 3050 ha (including 50 ha in organic) [4]. On the socio-economic level, Morocco annually exports about 19 thousand tons of fresh strawberries and 47 thousand tons of frozen strawberries. On average, the turnover made by strawberry and other red fruits is of the order of 1.5 billion DH, of which nearly 90% is exported. The activity also generates 3 million working days over a period of 9 months, from September to May. The strawberry represents a great economic and agro-industrial interest; however its production faces some difficulties at the origin

of the loss of its quality and its yield. For this Morocco have several physiological and morphological researches on red fruits. Indeed, as part of the national medium-term program for the genetic improvement of strawberry we conducted an agronomic study on two strawberry cultivars installed at the delta 9 greenhouse of the Larache experimental field, National Institute of Agricultural Research of Tangier, Morocco.

II. MATERIAL AND METHODS

Two cultivars of Fortuna strawberry of American and Victory origin of Spanish origin (Table 1) were installed at the Larache experimental station to evaluate their varietal behavior. These two cultivars are installed in delta 9 greenhouses, and were planted with 4 complete random block layouts. The Fortuna plantation took place on 01/10/2017 and Victory on 20/10/2017. Flowering instead on the 10/11/2017 for Fortuna and the 25/11/2017 for Victory. Each elementary parcel is made up of a ridge 60 meters long and 7 meters wide with four rows spaced 60 cm apart. The space between two ridges is 70 cm. We studied some physiological parameters such as chlorophyll level [5] and stomatal conductance [6], so we assessed the sugar content and taste quality of both cultivars.

Table 1: varieties studied and breeder origin

Variety	Obtenteur/fournisseur
Fortuna	USA
VICTORY	Espagne

III. RESULTS AND DISCUSSION

The yield

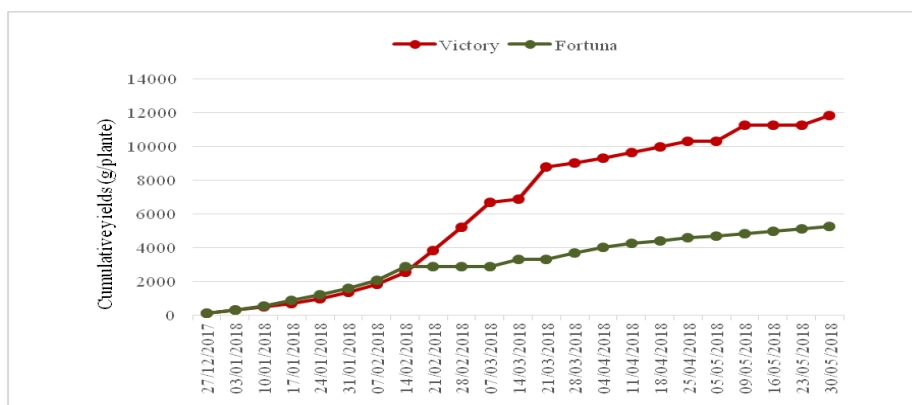


Fig. 1: Brut cumulative yields of two varieties of strawberry grown in the experimental field of INRA Larache during the companion 2017-2018.

Under the conditions of this trial, the Victory variety showed the best yield of 11855 (g/plant) compared to the Fortuna cultivar with an average yield of 5268 (g/plant) during the 2017-2018 companion (Fig. 1).

The sugar content:

In order to quantify and compare the Brix of the two varieties of Fortuna and Victory strawberries, we studied the sugar content of the different cultivars according to the maturity stages defined by RISSER et al., 1997. Thus, Fig

2 represents the sugar content of the varieties Fortuna and Victory cultivars for different maturity stages (Fig 3 and 4).

For the Fortuna variety the sugar content varies between 2.5 and 2.62% Brix, and for the Victory variety the content varies between 2.49 and 2.7% Brix, so the sugar content is higher in the Fortuna cultivar compared to the Victory cultivar.

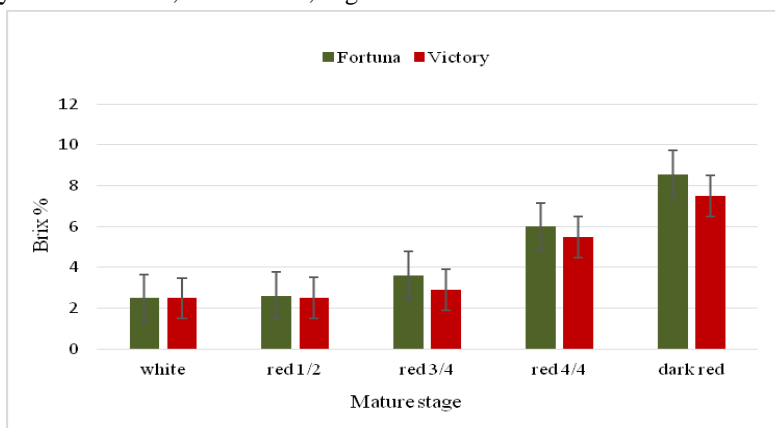


Fig. 2: Variation in sugar content (% Brix) for the two varieties studied.

The taste quality:

In both varieties studied we found that the two varieties Fortuna and Victory have almost the same taste criteria especially at the level of the color (bright red coloring), with a very good firmness, Intense perfume, taste quality is very high at Victory and less at Fortuna, sugar in the mouth moderately sweet compared to other varieties and

shelf life 3 days in the fridge. For the form the cultivar Fortuna is oblong while the cultivar Victory and round (table 4).

The differences exist at the form level while Fortuna is oblong and Victory round, texture in Fortuna mouth melting and other pasty.

Table 2: Characteristics of the two cultivars Fortuna and Victory.

Criteria	Cultivar	
	Fortuna	Victory
Fruit Color	Bright red In the fridge becomes dark red	Bright red to blood red
Shape and size of the fruit	Oblong	Round
Firmness	Very good	Very good
Perfume	Intense	Intense
Taste quality	Good taste, balanced fruit	Good taste
Sugar on the palate	Moderately sweet	Moderately sweet
Texture in the mouth	Fondant	Pasty
The duration of the conversation	Average (3 days)	Average (3 days)

Leaf area:

We compared the leaf area of the two cultivars Victory and Fortuna, the results shown in Figure 3 show that there is a remarkable difference between the leaf area of Fortuna and

Victory. The Victory cultivar shows a leaf area greater than 0.097 cm² compared to the Fortuna cultivar with a leaf area of 0.084 cm².

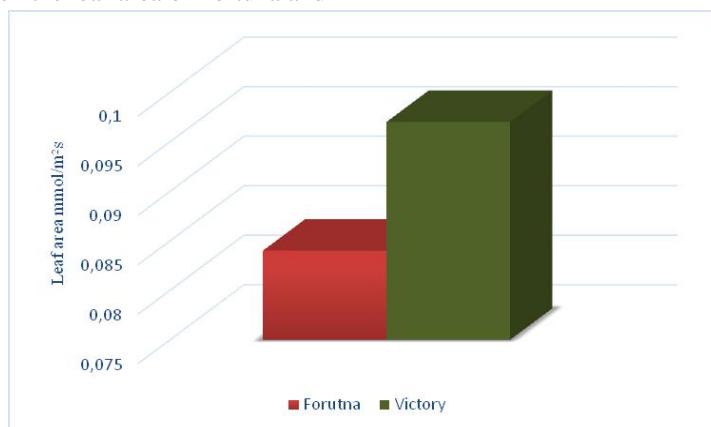


Fig.3: the leaf area of Fortuna and Victory.

The chlorophyll content:

The average chlorophyll level was measured for the plants of both varieties using a chlorophyll meter (SPAD). Fig. 4 shows the variation in the chlorophyll content of the two

cultivars Fortuna and Victory, noting that the chlorophyll content of the Fortuna cultivar is higher compared to the Victory cultivar.

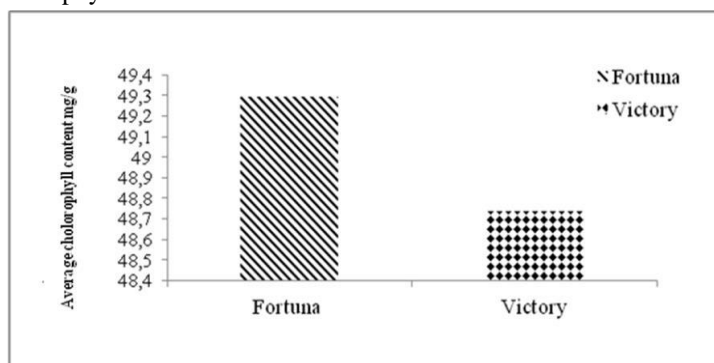


Fig.4: the average chlorophyll level in both cultivars

Stomatal conductance:

We studied stomatal conductance, to determine the effect of water stress on stomatal opening. Fig. 5 shows the mean

stomatal conductance in both cultivars; mean stomatal conductance in Victory cultivar is very high than stomatal conductance in Fortuna cultivar.

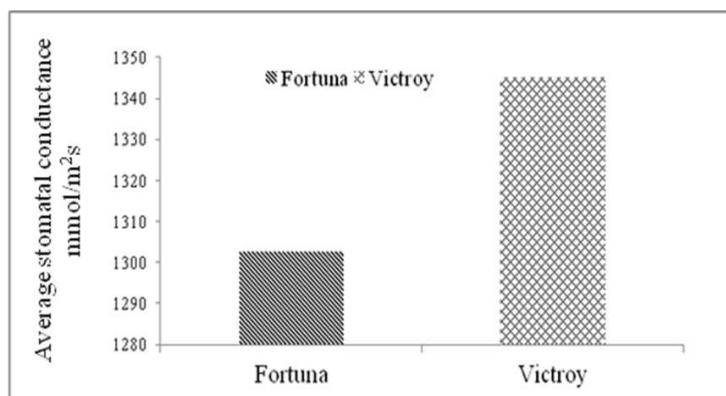


Fig. 5: Average Stomatal conductance

IV. CONCLUSION

During this study we tried to study some physiological and morphological parameters on two cultivars of strawberry to know their varietal behavior at the experimental station of Larache. The results show that there is a large difference in the parameters studied between the two cultivars studied. The Victroy cultivar showed the best yield compared to the cultivar Fortuna during this farming companion. The sugar level between the different stages increased to 2.7% for Victroy and 2.62% for Fortuna in the red stage $\frac{3}{4}$ and then decreased to 2.5 for both varieties. The Victroy cultivar showed greater leaf area and higher average stomatal conductance compared to the Fortuna cultivar, while the Fortuna cultivar showed higher chlorophyll content compared to the Victroy cultivar.

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