

STUDY OF CHILI PEPPER VARIETIES AND HYBRIDS (CAPSICUM ANNUUM) IN THE PEDOCLIMATIC CONDITIONS OF CLUJ COUNTY, ROMANIA

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Abstract. The diversity of uses of pepper in obtaining various products and culinary preparations, as well as its valuable content in nutrients explains the expansion of this crop. The nutritional value of pepper fruits is given by their content in carbohydrates (6-7%), proteins (1-1.3%), lipids (0.5-1%), vitamin C (100-300 mg / 100g substance fresh), vitamins A, P, B1, B2, B6, E, H and minerals such as potassium, phosphorus, calcium and iron, all of which sum up the dry matter. It can be seen that not the largest or most productive fruits lead to this result. In this study the highest values were registered for Paprica giallo with 13.76% soluble dry matter, respectively for the local variety with 9.34% soluble dry matter.

Keywords: peppers, analysis, production, vitamins

INTRODUCTION

A significant part of the vegetables, in addition to the high food content, also have healing and medicinal properties. These properties are due to the increased content of vitamins, mineral salts, organic acids, nutrients, biocatalysts and alkaloids, found in various vegetative organs of plants (Aguilar-Meléndez et al. 2009, Indrea et al., 2012).

Hot pepper (*Capsicum annuum*) is a popular species of the genus *Capsicum* that belongs to the *Solanaceae* family. This species turns out to be the most cultivated of all 4 known types of peppers. Hot peppers can be found in different sizes and shapes, and the intensity of their hot can vary from weak to intense: bell peppers, chilli or red-hot peppers. The medicinal properties of peppers are generally limited to their vitaminizing properties (especially as regards vitamins A and C). In this regard, the variety of hot peppers is an exception due to the irritating substance capsaicin, with multiple therapeutic indications. Also, the part that gives a pepper a spice, are the seeds.

Capsicum annuum, including sweet and hot peppers, belongs to the nightshade family and is a globally grown and economically important vegetable crop. (Carrizo García et al., 2016; <http://www.fao.org>).

Hot peppers contain about 83% water, 3% protein, 7% fibre, 6% carbohydrate, 0.6% fat and are excellent sources of vitamin C, vitamin A and most of the B vitamins (particularly vitamin B6); where the highest levels are observed in the ripe fruit. Hot peppers also contain significant amounts of potassium, magnesium and iron (Purseglove, 1974, Bahr and Davenport, 1982).

Pepper fruits (*Capsicum* spp.) are widely used as a spice (spices) in all locality's soups, stews and sauces and contain essential nutrients and vitamins A, E and C (Grubben and El-Tahir, 2004).

Culture responds to both organic and inorganic fertilizers, which have been reported by several researchers. Studies have looked at the response of different crops to the use of inorganic fertilizers in different ways, the use of inorganic fertilizers could be maintained or not maintain higher yields in some crops. (Olanrewaju and Showemimo, 2003, Khan et al., 2014).

MATERIAL AND METHODS

The biological material used in the experiment was three hybrids and three varieties, as follows:

Pietro F1 is a very productive hot pepper hybrid. The bearing of the plants is vigorous, the fruits are uniform. The fruits are dark green, and when ripe they change, becoming dark red. The plant of the Pietro F1 hybrid is vigorous and has a balanced bearing, fruiting excellently throughout the vegetation period. Pietro F1 is a hybrid that is primarily suitable for cultivation in protected, fenced areas.

Arwad F1 is a hybrid of hot peppers with long fruits on the Cayenne type. The hybrid has an average early age and is excellent for the climate of our country. The Arwad F1 hot pepper plant has a high vigour and an excellent binding potential that ensures a high production. The fruits are long, thin and with a smooth dark green exterior and when ripe they turn dark red. The internodes are medium, the hybrid being suitable for long cultivation cycles, being able to ensure uniform, high-quality production of hot peppers of the same size, from spring to autumn. The pulp of the hybrid is distinguished by its sharpness, not very pronounced. Arwad F1 is an excellent hybrid both for fresh consumption and for processing and preservation.

Hyffae F1 has a vigorous plant with rich foliage that covers the fruit very well until maturity. It has a high capacity to adapt to conditions of thermal stress (it binds well and continuously in both low and high temperature conditions). The fruits are dark green and turn bright red at biological maturity. Highly productive variety recommended both for crops in protected areas and in the open field for an extended production cycle. The fruits are very spicy.

The Cayenne variety is an early variety for open field cultivation. The plants have medium vigour. The fruits have an elongated shape and are dark green which at biological maturity turn dark red. The fruits are intended for fresh consumption and preservation.

The Paprika giallo variety is a variety especially recommended for the preparation of the famous Paprika. It tastes delicate, but spicy and very aromatic.

The local variety is an early, vigorous variety of hot pepper grown in the Cluj area, grown from generation to generation, binds well and continuously in both low and high temperatures.

Experimental Design and Statistical Analysis: The experimental design used in the two successive seasons was a randomized complete block with four replicates. The obtained data were statistically analysed using ANOVA and means separation was done using LSD test according to the method described by Carrizo et al. 2016.

RESULTS AND DISCUSSION

The average weight of hot peppers is generally correlated with their length and diameter measured at 1 cm from the petiole (Table 1).

The Arwad F1 hybrid, which recorded the strongest growth, has fruits with an average weight of more than 22.44 g, a length of 15.99 cm and a diameter of 14.59 mm, followed by the Hyffae F1 hybrid with 17.22 g, which it has shorter fruits (12.82 cm), but with a larger diameter (18.19 mm).

Table 1

Harvested fruit size

| Hybrid / variety | Average | | |
|------------------|-------------|---------------|------------|
| | Length (cm) | Diameter (mm) | Weight (g) |
| Pietro F1 | 12.08 | 15.03 | 14.22 |
| Arwad F1 | 15.99 | 14.59 | 22.44 |
| Hyffae F1 | 12.82 | 18.19 | 17.22 |
| De cayenne | 8.01 | 10.54 | 3.88 |
| Paprika giallo | 10.21 | 14.87 | 10.33 |
| Local variety | 8.22 | 11.85 | 7.88 |

The total production of hot peppers grown in the field in 2019 had low levels, being between 0.21 kg / m² and 1.63 kg / m², depending on the cultivar (Table 2).

The highest total production was recorded in the Arwad F1 hybrid (1.63 kg / m²), which also had the highest average fruit weight, and in the Hyffae F1 hybrid (1.19 kg / m²), which recorded increases, significant or distinctly significant yields compared to other cultivars.

Table 2

Total production of hot peppers

| Hybrid / variety | PRODUCTION kg / m ² | PRODUCTION (%) | The difference ± kg / m ² | Signification |
|------------------|--------------------------------|----------------|--------------------------------------|---------------|
| Pietro F1 | 0,38 | 100,0 | 0.00 | Mt |
| Arwad F1 | 1,63 | 433,6 | 1.26 | ** |
| Hyffae F1 | 1,19 | 315,0 | 0.81 | * |
| De cayenne | 0,15 | 39,8 | -0.23 | - |
| Paprica giallo | 0,21 | 56,6 | -0.16 | - |
| Soi local | 0,28 | 74,3 | -0.10 | - |
| | LSD (p 5%) | | | 0.71 |
| | LSD (p 1%) | | | 1.00 |
| | LSD (p 0.1%) | | | 1.45 |

At technical maturity, the soluble dry matter content of hot peppers varies between 5.02% for the Arwad F1 hybrid and 7.85% for the local variety (Table 3).

The Paprica giallo variety and the local variety show increases in soluble dry matter content of 38.5% and 38.8%, respectively, very significant compared to the control, the hybrid Pietro F1.

Table 3
Soluble dry matter content in hot pepper fruits at consumption maturity

| Cultivar | Soluble dry matter °Brix | Soluble dry matter (%) | Difference ± | Signification |
|----------------|--------------------------|------------------------|--------------|---------------|
| Pietro F1 | 5.66 | 100.0 | 0.00 | Mt |
| Arwad F1 | 5.02 | 88.7 | -0.64 | - |
| Hyffae F1 | 5.06 | 89.5 | -0.59 | - |
| De cayenne | 6.14 | 108.6 | 0.49 | - |
| Paprica giallo | 7.84 | 138.5 | 2.18 | *** |
| Soi local | 7.85 | 138.8 | 2.19 | *** |
| | LSD (p 5%) | | | 1.02 |
| | LSD (p 1%) | | | 1.44 |
| | LSD (p 0.1%) | | | 2.09 |

Hot peppers that have reached physiological maturity have a higher soluble dry matter content than technical maturity (Table 4). The highest increase in soluble dry matter content is found in the variety De cayenne by 5.63% and in Paprica giallo by 5.92%.

Table 4
Soluble dry matter content in hot peppers at physiological maturity

| Hybrid / variety | Soluble dry matter °Brix | Soluble dry matter (%) | Difference ± | Signification |
|------------------|--------------------------|------------------------|--------------|---------------|
| Pietro F1 | 8.97 | 100.0 | 0.00 | Mt |
| Arwad F1 | 8.17 | 91.0 | -0.80 | - |
| Hyffae F1 | 7.04 | 78.4 | -1.93 | - |
| De cayenne | 11.77 | 131.2 | 2.80 | * |
| Paprica giallo | 13.76 | 153.4 | 4.79 | *** |
| Soi local | 9.34 | 104.2 | 0.37 | - |
| | LSD (p 5%) | | | 2.26 |
| | LSD (p 1%) | | | 3.21 |
| | LSD (p 0.1%) | | | 4.65 |

CONCLUSIONS

The diameter of the harvested fruits in Cluj County pedoclimatic condition for the studied peppers, measured at 1 cm from the petiole, varies between 10.54 mm for the De cayenne variety and 18.19 mm for the Hyffae F1 hybrid, the shortest fruit we also have for the De cayenne variety, which records the smallest weight, respectively 3.88 g. The longest fruit has the Arwad F1 hybrid, with 22.44 g weight.

The soluble dry matter content is higher in the Paprica giallo variety, with 13.76 g / 100 g fresh matter.

REFERENCES

1. Bahr, R. and Davenport, R., 1982, Eat Better Live Better: a commonsense guide to nutrition and good health, Gardner J. L (ed) Reader's Digest Association.
2. Purseglove, W., 1974, Tropical crops: dicotyledons. London: Longmans English Language Book Society.
3. Carrizo García, C., Barfuss, M. H., Sehr, E. M., Barboza, G. E., Samuel, R., Moscone, E. A., Ehrendorfer, F., 2016, Phylogenetic relationships diversification and expansion of chili peppers (*Capsicum*, Solanaceae). *Annals of botany*. 118(1), 35-51.
4. Aguilar-Meléndez, A., Morrell, P. L., Roose, M. L., Kim, S.C., 2009, Genetic diversity and structure in semiwild and domesticated chiles (*Capsicum annuum*; Solanaceae) from Mexico, *American Journal of Botany*, 96(6), 1190-1202.
5. Indrea D. et al., 2009, *Cultura legumelor*, Editura Ceres, București
6. Grubben, G.J.H. and I.M. Tahir, 2004, *Capsicum* species, In: *Plant resources of Tropical Africa, 2. Vegetables*. Grubben.J.H. and Denton. O.A. (Eds.). PROTA Foundation, Wageningen Netherlands, Backhugs Publishers, Leiden, Netherlands. pp: 154-163.
7. Olanrewaju, J.D., Showemimo, F.A., 2003, Response of Pepper Cultivar to Nitrogen and Phosphorus Fertilization, *Nigerian Journal of Horticultural Science*, Vol. 8 No. 1.
8. Khan, F., Mahmood. T.A., Muhammad, S., Abdul Maalik, A., 2014, Pharmacological importance of an ethnobotanical plant: *Capsicum annuum* L. *Natural product research*, 28. 10.1080/14786419.2014.895723.