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Research on the growth and fruiting of some varieties of hot peppers in different types of crops

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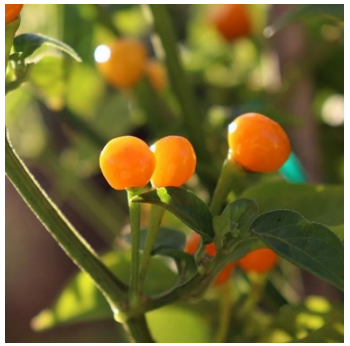
Introduction

The hot pepper, worldwide, is known for its high nutritional value, health benefits and medicinal properties. It is rich in vitamins and minerals, has antimicrobial and anticancer properties. Hot peppers have preventive and therapeutic properties for many conditions, such as various types of cancer, rheumatism, stiff joints, bronchitis and colds with coughs and headaches, arthritis, heart arrhythmias and many other conditions.

Biological material

C. annuum - Jalapeno

C. chinense – Habanero Red



C. baccatum – Aji Charapita

C. frutescens – Cayenne L.S.

C. pubescens - Rocoto

- Hot peppers are consumed every day by a quarter of the planet's population in countries around the globe. They are perennial shrubs belonging to the Capsicum family and were completely unknown to most of the world until Christopher Columbus made his way to the New World in 1492, but they were known to the people of their home areas.
- More than 25 species are known, but only 5 are cultivated worldwide: Capsicum annuum, Capsicum chinense, Capsicum frutescens, Capsicum baccatum and Capsicum pubescens, which are the subject of this study. They differ from each other by the color of the flowers and their number at the node, the color of the seeds, the shape and size of the fruit and, last but not least, the capsaicin content.
- Capsaicin is an alkaloid found in all species of hot peppers of the genus Capsicum and imprints the hot taste of pepper. Capsicum annuum (Jalapeno) has a capsaicin content of 373mg / kg, compared to Capsicum chinense (Habanero Red) which has a capsaicin content of 9097mg / kg (dry matter).

Materials and methods

- Research objectives:

- Knowledge of the biology of hot pepper species;
- Knowledge of the demands of hot pepper species against environmental factors;
- Knowledge of cultivation technology in relation to the biology of hot pepper species and environmental factors.

Location of the experience: Nucetu Village, Lupșanu Commune, Călărași County.

- Varieties studied in this experiment:
- Jalapeno - Capsicum annuum
- Habanero Red - Capsicum chinense
- Cayenne Long Slim - Capsicum fructescens
- Aji Charapita - Capsicum baccatum
- Rocoto - Capsicum pubescens

Scheme of the experiment

The experiment was of bifactorial type, in randomized blocks, with 2 variable factors respectively, the species / variety and the cultivation method (in soil and in pots of 7.5L Φ22). In the pots was used Kekkila DSM 3 W peat, special substrate for transplanting seedlings, sifted to a fine caliber of 0-6mm, with pH adjusted to 5.5 / 5.9, fertilized with fertilizer formula "starter" NPK 14-16-18 + ME.

The combination of the 2 factors resulted in 10 variants, two variants for each species / variety of hot pepper. Each variant had 3 repetitions, with 3 plants / repetition.

Experimental variants:

- V1 - Capsicum annuum - Jalapeno in soil
- V2 - Capsicum annuum - Jalapeno in pots
- V3 - Capsicum chinense - Habanero Red in soil
- V4 - Capsicum chinense - Habanero Red in pots
- V5 - Capsicum frutescens - Cayenne Long Slim in soil
- V6 - Capsicum frutescens - Cayenne Long Slim in pots
- V7 - Capsicum baccatum - Aji Charapita in soil
- V8 - Capsicum baccatum - Aji Charapita in pots
- V9 - Capsicum pubescens - Rocoto in the soil
- V10 - Capsicum pubescens – Rocoto in pots

Observations and measurements

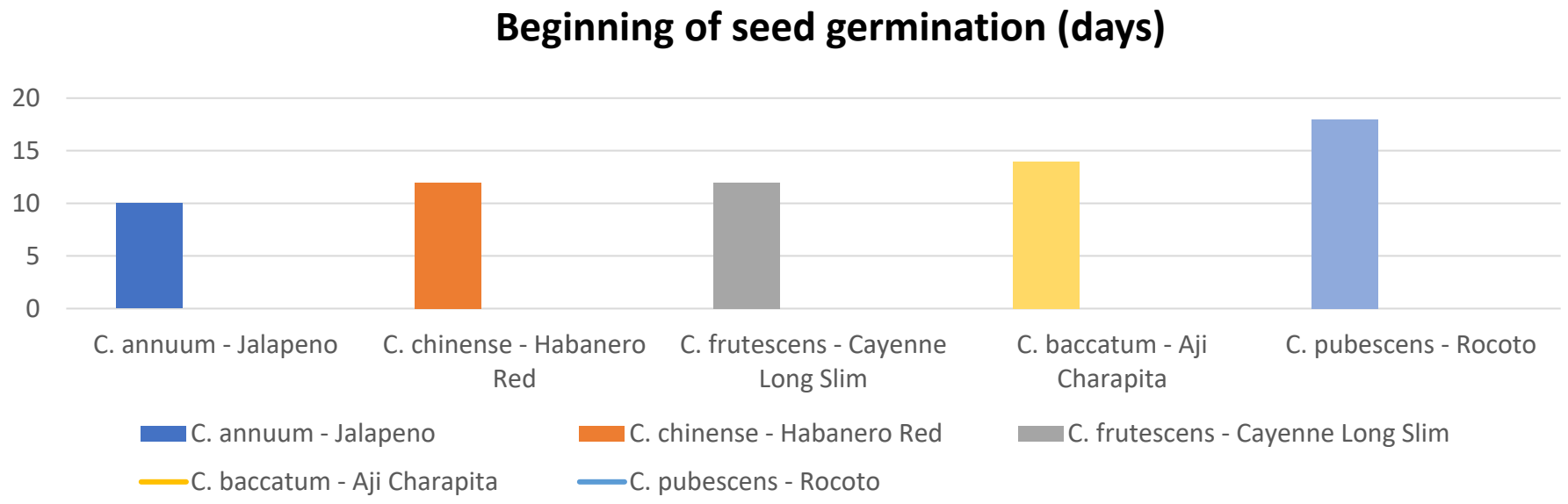
- Determination of germination time for each species;
- Seedling characteristics at planting;
- Plant height;
- Shrub diameter;
- The thickness of the plant stem;
- Number of shoots;
- Number of fruits harvested;
- Fruit weight;
- Production per plant;
- Morphological properties of fruits.

Applied care work

- Irrigation to maintain the reclaimed substrate through the pen drip system;
- Repeated breaking the grown shoots at the base, except for the varieties Aji Charapita, Rocoto and Cayenne Long Slim;
- Palisade in all varieties, both in pots and in the soil, except the variety Aji Charapita (Capsicum baccatum), because the stem is high and can not sustain itself;
- Pinch of Jalapeno (C. annuum), Cayenne Long Slim (C. frutescens)
- Ventilation through a system with 4 windows, two of which with automatic opening / closing, correlated with the evolution of climatic factors during the vegetation period.

Results and discussions

The onset of germination of hot pepper seeds was recorded after a different number of days, depending on the species. In all hot pepper species, emergence occurred later than in Capsicum annuum, respectively after 12 days in Capsicum chinense and Capsicum frutescens, after 14 days in Capsicum baccatum and after 18 days in Capsicum pubescens, as shown in the the chart below.



Results and discussions

Biometric characteristics of seedlings at planting

Analyzing the characteristics of seedlings at planting, there were differences between species / varieties, within the specific limits of pepper. The height of the plants varied between 10 cm in C. chinense and 23 cm in C. annuum, the plants with the largest thickness at the stem, respectively 7 mm, were obtained at C. pubescens, and the largest number of leaves at C. baccatum, respectively 20.

Jalapeno (C. annuum)			*Habanero Red (C. chinense)*			*Cayenne Long Slim (C. frutescens)*			*Aji Charapita (C. baccatum)*			*Rocoto (C. pubescens)*		
Seedling height	Thickness of the stem	The number of leaves	Seedling height	Thickness of the stem	The number of leaves	Seedling height	Thickness of the stem	The number of leaves	Seedling height	Thickness of the stem	The number of leaves	Seedling height	Thickness of the stem	The number of leaves
23 cm	6 mm	8	10 cm	3 mm	8	25 cm	5 mm	10	15 cm	3 mm	20	20 cm	7 mm	12

Results and discussions

Biometric characteristics of hot pepper plants

The hot pepper studied reacted differently not only from the point of view of the species / variety, but also from the point of view of the cultivation method. The most vigorous plants were obtained in soil cultivation compared to pot culture, the plants reaching 155 cm in Japaleno, 175 cm in Cayenne Long Slim and 210 cm in Rocoto, Aji Charapita having the lowest height, respectively 75 cm. In potted crops the height of the plants was 15-20 cm lower than in the soil, except for the Rocoto variety where the difference was 105 cm. The thickness of the stem at the bottom and the diameter of the bush were close between the plants grown in the ground and in pots, as well as the number of shoots, except for the Japaleno variety which formed with 10 more shoots in pots than in soil.

	Jalapeno (C. annuum)		*Habanero Red (C. chinense)*		*Cayenne Long Slim (C. frutescens)*		*Aji Charapita (C. baccatum)*		*Rocoto (C. pubescens)*	
Type of culture	**Ghiveci**	**Sol**	**Ghiveci**	**Sol**	**Ghiveci**	**Sol**	**Ghiveci**	**Sol**	**Ghiveci**	**Sol**
Plant height (cm)	125	155	105	120	125	175	55	75	105	210
Shoots (no.)	34	24	12	14	32	38	3	3	14	16
Stem thickness at bottom (mm)	17	22	16	18	14	18	7	8	15	19
Shrub diameter (cm)	78	70	75	75	70	77	60	80	65	65

Results and discussions

Production capacity of some hot pepper varieties

The study of the productive behavior of the species / varieties of hot peppers, cultivated in the soil and in the pots, showed that they were more productive in the pots than in the soil, being better controlled the irrigation and fertilization of the plants. The average weight of the fruits varied greatly with the species / variety, but in potted plants the fruits were slightly higher in all species, except for the Habanero Red variety where the same average weight of the fruits was recorded in pots and on the ground. Also, the highest production was also obtained in potted plants, keeping the differences between the studied hot pepper species. Rocoto did not bear fruit in pots, and in the soil the fruits of this variety did not ripen. The vegetation period of the Rocoto variety is too long to be grown in a solarium in Romania, and for soil cultivation it is recommended to use larger pots, given the size reached by the plants.

	Jalapeno (C. annuum)		*Habanero Red (C. chinense)*		*Cayenne Long Slim (C. frutescens)*		*Aji Charapita (C. baccatum)*		*Rocoto (C. pubescens)*	
Type of culture	**Pots**	**Soil**	**Pots**	**Soil**	**Pots**	**Soil**	**Pots**	**Soil**	**Pots**	**Soil**
Harvested fruits (pcs / 9 plants)	482	528	373	220	689	455	767	566	-	381
Total weight (g / 9 plants)	7876	5933	3408	2010	2793	1792	126	102	-	5220
Average weight / fruit (g)	16,34	11,23	9,13	9,13	4,05	3,93	0,16	0,18	-	13,7
Nr. fruits / plant	53,5	58,6	41,4	24,4	76,5	50,5	85,2	62,8	-	42,3
Average production / plant(g)	875,11	659,22	378,66	223,33	310,33	199,11	14	11,33	-	580

Results and discussions

Morphological properties of fruits

The hot pepper fruits had different characteristics, because they come from different species, but they were also slightly influenced by the cultivation method. Hot peppers grown in pots form fruits slightly larger than in the soil, but their color is not influenced at all by the method of cultivation, being the same in both modes of cultivation. Rocoto, being with a long vegetation period, did not form fruit except in the soil.

Variety / Species	Cultivated in pots				Cultivated in soil			
	Length (cm)	Width (cm)	Average weight (g)	Color	Length (cm)	Width (cm)	Average weight (g)	Color
Jalapeno (Capsicum annuum)	7,8	1,9	16,34	Bright red	6,2	2,2	11,23	Bright red
Cayenne Long Slim (Capsicum frutescens)	14,8	1,3	4,05	Bright red	13,1	1,1	3,93	Bright red
Habanero red (Capsicum chinense)	4,2	3,3	9,13	Bright red	4,1	3,3	9,13	Bright red
Aji Charapita (Capsicum baccatum)	1,1	0,9	0,16	Orange	1,3	1,1	0,18	Orange
Rocoto (Capsicum pubescens)	-	-	-	-	5	4	13,7	Green (unripe)

Conclusions and recommendations

- Following the research carried out with the 5 species of hot peppers, it appears that all species of hot peppers can be grown both in pots and directly in the soil.
- Very few pests were observed in the experiment, so hot peppers can be successfully grown organically.
- Potted plants can be grown as perennials, for the Rocoto variety (Capsicum pubescens) being even recommended.

Conclusions and recommendations

- There were differences between varieties / species in terms of early seed germination, vegetative growth, fruiting potential and degree of speed, appreciated in taste;

- Higher production for some varieties of hot peppers (Habanero Red, Jalapeno) can bring substantial income due to the high prices of these fruits.