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Original Article

Behaviour of some Tomatoes (*Lycopersicon esculentum* Mill.) and Cucumber (*Cucumis sativus* L.) Landraces to some Phytophagous Parasites

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Abstract

The failure of industrialized agriculture, on the one hand, and the advantages of the landraces of cultivated plants on the other one, determined the European and global bodies to enact some measures concerning the conservation of green plants genetic resources. 28 tomato landraces and 12 cucumber landraces from seven counties of Transylvania were collected and identified in 2009. The behaviour of these landraces, cultivated both in plastic tunnel and filed, to the attack of diseases and pests was studied. In case of tomatoes, the level of attack of greenhouse white fly and black fungus was studied. Concerning the cucumber, the resistance to common mite and aphids was assessed. For comparison, five approved cucumber cultivars and four of tomatoes were cultivated. Regarding the tomatoes, the landraces: BN-360, CJ-357, CV-346, SJ-385 and SM-339 registered the lowest attack of greenhouse white fly (*T. vaporariorum* Westwood). The same landraces registered also the lowest attack of black fungus (*Capnodium* sp.), this being a direct interrelation. Instead, in case of the four approved cultivars, the resistance to the greenhouse white fly was rated as low. Concerning the cucumbers the level of common mite (*T. urticae* Koch.) attack was: low in case of nine landraces (75%) and medium in case of three landraces (25%). Eleven landraces proved a high resistance to aphids (*C. gossypii).* Our research on the behaviour of tomatoes and cucumbers (12) landraces to pests brought into notice four tomatoes landraces with high resistance to greenhouse white fly and implicit to black fungus. As concerns the cucumbers, eight landraces have had high resistance to common mite and aphids.

Keywords: landraces, tomatoes, cucumber, resistance, mites, aphids, greenhouse white fly, black fungus.

1. Introduction

The landraces of cultivated plants are considered as an invaluable genetic heritage. Altough, allong his existance, man is a creator of genetic biodiversity the streamlining of agriculture begining with the second part of the XXth century had as consequence the acceleration of genetic erosion.

Just after the Conference that took place in 1992 in Rio de Janeiro precisely measures for saveing the landraces were adopted. Within that conference the Convention on Biodiversity was enacted. Hence, at global and European level divers documents - The International Treaty on Plant Genetic Resources for Food and Agriculture (2001), 98/95 EEC Directive - were enacted [4, 12, 16]. If at European level is given attention to these vegetal genetic resources, in Romania, politicians don't give the befitting importance to these vital aspects of a sustainable agriculture.

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Research on the resistance of cucumbers to some diseases were performed in Spain by Picó et al. (2008) [11]. They managed to identify a couple of cucumber landraces that are partial resistent to vein yellowing cucumber mosaic virus (CVYV). These researches were started due to the fact that in the last few years CVYV threatens the production of Spanish cucumber which, on a very large scale is based on hybrids that are highly sensitiv to this virus. The landraces identified as partial resistant to CVYV will be cultivated in integrated production systems and will be used to obtain new resistant cucumber hybrids. Al-Rawahi et al. (2011), Lepse et al. (2000), Tatlioglu, T. (1993), Huang et al. (2009), Sebastian et al. (2010) carried out researches concerning the genetic diversity of cucumber landraces [1, 6, 7, 13, 14].

In Greece, Terzopoulus and Bebeli (2010) study 36 characteristics at 34 landraces of tomatoes [15]. Casals et al. (2011), in Spain, studied two tomatoes landraces (Montserrat and Pera Girona) that have a very good niche on the market [3]. Mazzucato et al. (2008) collected 50 tomatoes landraces which originate mainly from the center of Italy; they also characterized these landraces from morphological and molecular point of view [10]. Andreakis et al. (2004) performed a very complex biochemical and molecular characterization of 25 cherry-tomatoes landraces named Corbarino and cultivated in Sarno Valley, Campania region. For comparison were studied 8 tomatoes cultivars used in the region [2]. The researchers noted that the ISCI tomato landrace has the best results at conservation and suggested that it should be proposed for the institution of a Label of Origin.

Digilio et al. (2010) manage to identify genotypes of tomatoes resistant to aphids and conclude that traditional germplasm can be an important source of resistance to aphid attack that can be used for obtaining new tomatoes cultivars [5].

In Romania, the Bank of Vegetal Genetic Resources - Suceava undertakes the most important activities of identification and conservation of genetic resources.

Within UASVM Cluj-Napoca about 200 landraces of cultivated plants, mostly vegetables were collected, identified and characterized [8, 9]. The landraces associated with characterization and passport descriptors were conserved as seeds at Suceava Gene Bank. The article presents aspects regarding the resistance of the studied tomatoes and cucumber landraces to various phytophagous parasites.

2. Material and Method

The 12 cucumber landraces come from four counties of Romania and were collected from market places or directly from the vegetable seed producers. Most of the seed samples were collected from Sălaj county (7), followed by the counties Cluj (3), Bistriţa-Năsăud (1) and Satu Mare (1). The localities altitude varies between 126 m (Satu Mare, county Satu-Mare) and 465 m (Preoteasa - Sălaj). The researches carried out in experimental field proved that 100% of the cultivars are genuine landraces (Table 1).

Forward are specified the basic elements of the characterization descriptors that are associated with the cucumber seeds within the Suceava Gene Bank: samples code, observations on plant (growth and reproduction type, resistance to aphids - *Cerosipha gossypii* - and to spider mites - *Tetranychus urticae* Koch.), observations on leafs (size of leafs margins, intensity of leafs green colour), observations on fruit – fruits length (cm), fruits width (diameter) (cm), prevalent shape of fruit at calyx, colour of thorns, prevalent colour of the exocarp at consumption and physiologic maturity, parthenocarpy, seed weight (100 seeds) – grams.

Table 1. Data regarding the cucumber landraces (*Cucumis sativus* L.) studied within UASVM Cluj-Napoca, in 2009

No.	Landraces code	County	Locality	Latitude	Longitude	Altitude
1.	BN 361	Bistrița-Năsăud.	Măluț	47,17° N	24,07° E	250
2.	CJ 359	Cluj	Iclod	46,98° N	23,8° E	250
3.	CJ 365	Cluj	Ocna Dej	46,05° N	23,48° E	320
4.	CJ 366	Cluj	Ocna Dej	46,05° N	23,48° E	320
5.	SJ 331	Sălaj	Preoteasa	47,12° N	22,73° E	465
6.	SJ 333	Sălaj	Preoteasa	47,12° N	22,73° E	465
7.	SJ 334	Sălaj	Preoteasa	47,12° N	22,73° E	465
8.	SJ 335	Sălaj	Rona	47,08° N	23,28° E	270
9.	SJ 368	Sălaj	Crasna	47,17° N	22,9° E	320
10.	SJ 372	Sălaj	Crasna	47,17° N	22,9° E	320
11.	SJ 375	Sălaj	Marin	47,17° N	22,9° E	320
12.	SM 341	Satu Mare	Satu Mare	47,47° N	22,88° E	126

In autumn 2008 the tomatoes cultivars were collected as seeds from seven counties of Transylvania as follows:

- Alba – 3 cultivars,
- Bistrița-Năsăud – 2 cultivars,
- Cluj – 12 cultivars,
- Covasna – 1 cultivar,
- Mureș – 1 cultivar,
- Satu Mare – 3 cultivars,
- Sălaj – 13 cultivars.

Most of the cultivars come from Cluj (12) and Sălaj (13) counties (Table 2).

Each cultivar received a unique identification code which is compounded of the counties abbreviation and a serial number.

The second part of the code is unrepeatable no matter the species, landrace, year or location of origin.

This measure was taken in order to avoid any possibility of confusion.

Table 2. Data regarding the Romanian counties where the tomatoes (*Lycopersicon esculentum* Mill) seeds were collected from, in order to establish the trial in 2009

No.	County	Localities/landraces identification code	Cultivars	Landraces
1.	Alba	Sebeș (AB 343, AB 344), Mihalț (AB 347)	3	3
2.	Bistrița Năsăud	Sângeorz Băi (BN 345), Măluț (BN 360)	2	2
3.	Cluj	Ocna Dej (CJ 348, CJ 350, CJ 352), Câțcău (CJ 353, CJ 355, CJ 356), Iclod (CJ 357, CJ 358, CJ 363)	12	9
4.	Covasna	Telechia (CV 346)	1	1
5.	Mureş	Sălcud - Iernut (MS 354)	1	1
6.	Satu Mare	Satu Mare (SM 338, SM 339, SM 340)	3	3
7.	Sălaj	Rona (SJ 330), Preoteasa (SJ 332), Sânpetru Almașului (SJ 336), Crasna (SJ 367, SJ 369, SJ 370, SJ 371, SJ 373, SJ 385)	13	9
		TOTAL	35	28

It was applied the classically crop technology. No phytosanitary treatments were applied.

Each landrace was cultivated both in tunnel and field.

The resistance to pests (aphids, spider mites) was studied just in the covered areas. The climatic conditions in 2009 were not favourable to blight (*Pseudoperonospora cubensis*) and angular leaf spot (*Pseudomonas lacrymans*) attack.

The attack was sporadic in case of all varieties reason why no conclusions regarding the resistance to these diseases could be derived.

For comparison, five cucumber varieties were taken into study: Pasalimo, Alibi, Mathilde, Marketmore, Cornişon.

For each variety was assessed the resistance to spider mites attack using three classes of resistance: low, medium and high.

3. Results and Discussions

Concerning the cucumbers resistance to spider mite attack (*Tetranychus urticae* Koch.) nine varieties (75%) were highly resistant and three varieties (25%) had a medium resistance to this pest (Table 3). In order to assess the resistance to aphids (*Cerosipha gossypii*) the cucumber landraces were fallen in the following three classes of resistance: low, medium and high. Out of the twelve cucumber landraces, eleven have a high resistance to aphids (*Cerosipha gossypii)* and just one landrace had a medium resistance.

The officially cultivars dislpayed a higher sensitivity to both pests. Hence, three cultivars displayed a low resistance, one had medium resistance and just one had high resistance to spider mites attack.

These cultivars displayed a medium and high resistace to aphids attack.

The tomatoes landraces resistance to greenhouse white fly attack was assessed using four classes: low, medium, high and very high.

For assessing the resistance to black fungus the degree of attack (DA%) was calculated using the formula: DA% = F% x I %/100 where F% = frequency, I% = intensity of attack, with 6 classes.

As Table 4 show that the greenhouse white fly (*Trialeurodes vaporariorum* Westwood) attack varies between quite wide lines from low to very high. The BN-360, CJ-357, CV-346, SJ-385 and SM-339 landraces had the lowest degree of attack.

Table 3.Behaviour of the cucumber landraces (cultivated in tunnel) to spider mite (*Tetranychus urticae* Koch) and aphids (*Cerosipha gossypii*) attack

No.	Landrace/cultivar	Resistance to spider mite *(Tetranychus urticae* Koch*.)* attack	Resistance to aphids (*Cerosipha gossypii*) attack
1.	BN 361	high	high
2.	CJ 359	high	high
3.	CJ 365	high	high
4.	CJ 366	high	high
5.	SJ 331	medium	high
6.	SJ 333	high	medium
7.	SJ 334	high	high
8.	SJ 335	high	high
9.	SJ 368	medium	high
10.	SJ 372	high	high
11.	SJ 375	high	high
12.	SM 341	medium	high
13.	Pasalimo	low	high
14.	Alibi	low	high
15.	Mathilde	low	high
16.	Marketmore	high	medium
17.	Cornişon	medium	medium

The same landraces displayed also the lowest degree of attack in case of black fungus (*Capnodium* sp.).

Instead, all four modern cultivars proved a low resistance to greenhouse white fly attack.

The resistance to both pests was assessed in case of the plants cultivated in tunnel. In the experimental field pests like: blight (*Phytopthora infestans* Mont.), Septoria leaf spot (*Septoria lycopersici* Speg.) and grey mold (*Botrytis cinerea* Pers.) had a sporadic symptom both landraces and modern cultivars.

Unfortunately, due to adversely climatic conditions of 2009, no conclusions regarding the resistance to these pests could be derived.

Also it was ascertained that all studied landraces have well tolerated the conditions in covered area.

Table 4. Resistance of tomatoes (*Lycopersicum esculentum* Mill.) landraces studied in 2009 at UASVM to parasites attack

No.	Landrace/cultivar	Level of greenhouse white fly *(T. vaporariorum)* attack	Black fungus *(Capnodium sp.)* degree of attack (%)	
			Degree of attack on plant (%)	Degree of attack on fruit (%)
1.	AB-343	high	76.5	50
2.	AB-344	medium	30	40
3.	AB-347	medium	30	10
4.	BN-345	very high	93.1	60
5.	BN-360	low	24	24
6.	CJ-348	medium	81	16
7.	CJ-350	medium	33.3	30
8.	CJ-352	high	72	50
9.	CJ-353	high	95	15
10.	CJ-355	medium	46.8	22.5
11.	CJ-356	medium	30	20
12.	CJ-357	low	32	12.7
13.	CJ-358	medium	50	0
14.	CJ-363	high	56	0
15.	CV-346	low	0	0
16.	MS-354	medium	76.5	20
17.	SJ-330	high	68	40
18.	SJ-332	medium	68	10
19.	SJ-336	medium	48	10
20.	SJ-367	medium	45.5	18
21.	SJ-369	medium	36	0
22.	SJ-370	medium	50	0
23.	SJ-371	medium	48	30
24.	SJ-373	high	94	40
25.	SJ-385	low	32	1.5
26.	SM-338	medium	24	30
27.	SM-339	low	0	0
28.	SM-340	medium	67.5	30
29.	Korall	low	83.5	51
30.	Unibac	low	91.2	60
31.	Dacia	low	93.5	62
32.	Unirea	low	88	36

4. Conclusions

Twelve cucumber landraces originating from 4 counties of Transylvania and 28 tomatoes landraces originating from 7 Transylvanian counties were identified.

Within the trials, 4 tomatoes landraces proved a high resistance to greenhouse white fly and black fungus attack (BN-360, CJ-357, CV-346, SJ-385 and SM-339). Eight cucumber landraces were highly resistant to spider mites and aphid attack (BN 361, CJ 359, CJ 365, CJ 366, SJ 334, SJ 335, SJ 372, SJ 375). Generally speaking, the officially cultivars of both vegetable species proved a higher sensitivity to the studied parasites in comparison with the landraces.

The seeds of the cucumbers and tomatoes landraces were send for preservation to Suceava Gene Bank and were associated with passport and characterization descriptors.

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