Multi-Science Journal *2015; 1(2):124-132*

ARTIGO ORIGINAL

Relationship of the firm with plant organ with aggressiveness oh *Phytophthora capsici*

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ABSTRACT

The aim of this work was to relate the susceptibility of fruits, roots and stems of vegetables infected by *P. capsici* to the firmness of the pulp. The treatments were represented by 18 genotypes (carrot, papaya, chayote, apple, sweet pepper, kaki, sweet potato, gherkim, melon, tomato, gilo, potato; two genotypes of cucumber and three genotypes of pumpkim), in three replications in a delineation completely randomized designed, resulting 18*3 experimental units (EU). At the first day, with the support of a probing (tip 5 mm), the firmness of the fruits were evaluated. After that stabs of micelium of 5 mm of diameter (Pcp 42, sweet pepper) were inoculated in the wound provoked by the probing (early measured). During 7 days after the inoculating, the lesion length was evaluated, allowing the calculation of the area under the lesion progress curve (AUCPL). The incubation period was also estimated (between the inoculation and the emergence of the symptoms) and determinated the isolated pathogenicity to the genotypes in study. Cucumber (conserve and green), eggplant and sweet pepper had had the highest averages of ABCIP (F17,36=28,76**), differing statistically from the other. Tomato, gala apple and pepper had had the lowest scores of firmness (F17,36=46,81**), also differing statistically from the other. The relationship among the values of firmness and AUCPL demonstrated that as the fruit's firmness increases the susceptibility reduces in up to 58 % (r**=-0,5796). That is the first work the relates firmness of fruits to susceptibility of *P. capsici* in Brazil.

Keywords: fruits, susceptibility, resistance.

Relacionamento da firmeza de órgãos vegetais com a agressividade de *Phytophthora capsici*

RESUMO

O objetivo deste trabalho foi relacionar a susceptibilidade de frutos, raízes e caules de hortaliças infectados por *P. capsici* com a firmeza da polpa. Os tratamentos foram representados por 18 espécies e/ou genótipos (um genótipo: cenoura, mamão, chuchu, maçã, pimentão, caqui, batata doce, maxixe, melão, tomate, jiló, berinjela e batata; dois genótipos: pepino; três genótipos: abóbora), em três repetições, num delineamento inteiramente casualizado, totalizando 18*3 unidades experimentais (UE). Ao primeiro dia, com o auxílio do penetrômetro (ponteira 5 mm) avaliou-se a firmeza de frutos. Em seguida inoculou-se discos de micélio de 5 mm de diâmetro (código Pcp 42, *P. capsici* oriundo de pimentão) no ferimento realizado pelo penetrômetro (medido antecipadamente). Durante um período de 7 dias após a inoculação avaliou-se o comprimento da lesão, permitindo o cálculo da área abaixo da curva de progresso da lesão (AACPL). Foi também estimado o período de incubação (entre a inoculação o aparecimento de sintomas) e, avaliada a patogenicidade do isolado aos genótipos inoculados. Pepino (conserva e verde), berinjela e pimentão tiveram as maiores médias de área abaixo da curva de progresso da lesão (AACPL) [$F_{17,36}$=28,76**], diferindo estatisticamente dos demais. Tomate, maçã gala e pimentão tiveram os menores índices de firmeza nos tratamentos analisados [$F_{17,36}$=46,81**], também diferindo estatisticamente dos demais. O relacionamento entre os valores de firmeza e os valores de AACPL demonstrou que à medida que aumenta a firmeza de frutos reduz-se a susceptibilidade destes em até 58 % (r**=-0,5796). Este é o primeiro trabalho que relaciona a firmeza de frutos com a suscetibilidade de *P. capsici* no Brasil.

Palavras-chave: frutos, suscetibilidade, resistência.

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Recebido em: 09 abr. 2015
Aceito em: 04 mai. 2015
Editor responsável: Prof. Dr. José Antonio Rodrigues de Souza

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INTRODUCTION

The fungi *Phytophthora capsici* is a polyphagous pathogen, and Brazil is no record of about 15 hosts (SBML, 2007). There are many lines of research led by groups of São Paulo, Bahia and the Federal District, seeking to elucidate the relationship of *P. capsici* and their hosts, however, little is known about the relationship of fruit firmness with the aggressiveness of *P. capsici* (Paz Lima, 2006).

Were reported 48 host species of *P. capsici* in the world, including avocado, alfalfa, cotton, pumpkin, vanilla, eggplant, cocoa, onions, carrots, citrus, chayote, datura, peas, spinach, fava beans, figs, tobacco, sunflower, flax, melon, apple, macadamia, watermelon, okra, pear, cucumber, green pepper, black pepper, tomato and *Spondias purpurea*. The geographical distribution of these incidents involving countries such as Argentina, Brazil, Bolivia, Cameroon, Korea, China, Spain, USA, France, Indonesia, Iran, Italy, Japan, Puerto Rico, Serbia, Taiwan, Thailand, the former Soviet Union, Venezuela (Erwin e Ribeiro, 1996).

The hosts belonging to the Solanaceae family Cucurbitaceae and are the major plant families that are infected by *P. capsici* (SBML, 2007; Paz Lima, 2006), and these hosts have varying degrees of firmness of the organs of infection. The losses caused by *P. capsici* in vegetables are hugely significant and the mechanism of resistance to infection in plants and fruits occurs differently. Not always a tough plant has a fruit also resistant to infection (fruits are generally more susceptible). This resistance mechanism related to pulp was indicated by Lustosa et al. (2007).

According to the database CENARGEN (2007) the fungus *P. capsici* is virulent to different host species belonging to the family Cucurbitaceae, Euphorbiaceae, Leguminosae, Piperaceae, and Solanaceae Sterculiaceae. In the database SBML (2007) did not find any record of the occurrence of *P. capsici* infecting potato (*Solanum tuberosum* L.), sweet potato (*Ipomoea batatas* L.), chayote (*Sechium edule* Swartz), persimmon (*Diospyros kaki* L.), carrot (*Daucus carotae* L.), apple (*Malus domestica* Borkh) papaya (*Carica papaya* L.) and cucumber (*Cucumis anguria* L.) in Brazil. And in that same database has recorded occurrence of *P. capsici* infecting papaya and carrot in the U.S., Italy and kaki chayote in Costa Rica.

In Index Fungorun (2007) has recorded 129 species of *Phytophthora* without mentioning the varieties. In this database to Phytophthora species was described in the following taxonomic categories: Family Pythiaceae, Order Pythiales, Class Oomycetes, Filo Oomycota, Chromista Kingdom.

The species *P. capsici* Leonian (1922) was first described in New Mexico, USA, as agent of blight or late blight of pepper (*Capsicum annuum* L.). Q. For some time *P. capsici* was considered had host-specific-, but with the assignment of new hosts in other regions of the world, proved to be polyphagous and cosmopolitan. This species is widespread in almost all continents except Oceania and cause different diseases in their hosts ranging from blight or blight and-fall-of-abnormal leaves, rot of fruits, stems and roots (LIGHT et al., 2003). In Brazil, *P. capsici* was first reported in pepper, by Amaral, in 1952, having greatly increased the number of their hosts in the country since then. In the late 1970s and early 1980s, *P. capsici* was responsible for the loss of numerous plantations of black pepper in southern Bahia, often located close to cocoa and rubber plantations (LIGHT et al., 2003).

The penetrometer is an instrument for assessing quality and stage of harvest on many fruits and vegetables. In plant material degradation occurs in which the cell wall components during ripening is that the penetrometer can find more uses in laboratories and quality control of raw material. The wedge is typically not very useful to evaluate the change of firmness caused by dehydration, since reading can increase inversely with the perceived firmness. Typically, the firmness decrease during ripening of fruits such as persimmon, apple, melon, pear, peach and tomato (Calb e Moretti, 2007).

MATERIAL E METHODS

Experiment setup

In the Laboratory of Plant Pathology, hosts were analyzed 18 and 15 of these represented fruits (pumpkin, green pumpkin, pumpkin blast, eggplant, persimmon, chayote, gilo, apple, papaya, cucumber, melon, cucumber green, cucumber preserves, peppers, tomatoes), had two roots (carrots, sweet potatoes) and represented a stem (potato), Table 1. The experiment was prepared under the completely randomized design with 18 treatments and three replications, totaling 54 experimental units.

Inoculation

The isolate used was obtained in 2006, donated by Embrapa Hortaliças come from field production of sweet pepper (Pcp 42), located in the city of Novo Gama, DF, preliminarily identified as *P. capsici*. We used mycelial discs of 5 mm in diameter (injury caused by the penetrometer equipment) for carrying out the procedures of inoculation treatments - fruits, stems and roots. The fruits remained on the environmental conditions under conditions of moist chamber.

Table 1. Pathogenicity in different hosts, belonging to different botanical families were inoculated by *Phytophthora capsici* evaluated during a period of 7 days.

Rep.	Host	Family	Evaluable Days 1	2	3	4	5	6	7
1			-	-	-	-	-	-	-
1	Cenoura - *Daucus carotae* L.	*Apiaceae*	-	-	+	+	+	+	+
1			-	-	-	-	-	+	+
2			-	+	+	+	+	+	+
2	Mamão papaia - *Carica papaya* L.	*Caricaceae*	-	+	+	+	+	+	+
2			-	+	+	+	+	+	+
3			-	-	-	-	-	-	-
3	Batata-doce - *Ipomoea batatas* L.	*Convolvulaceae*	-	-	-	-	-	-	-
3			-	-	-	-	-	-	-
4			-	+	+	+	+	+	+
4	Maxixe - *Cucumis anguria* L.	*Cucurbitaceae*	-	+	+	+	+	+	+
4			-	+	+	+	+	+	+
5			-	-	+	+	+	+	+
5	Melão Cantaloupe - *Cucumis melo* L.	*Cucurbitaceae*	-	-	-	+	+	+	+
5			-	+	+	+	+	+	+
6			-	+	+	+	+	+	+
6	Pepino conserva - *Cucumis sativus* L.	*Cucurbitaceae*	-	+	+	+	+	+	+
6			-	+	+	+	+	+	+
7			-	-	+	+	+	+	+
7	Pepino verde - *Cucumis sativus* L.	*Cucurbitaceae*	-	-	+	+	+	+	+
7			-	-	+	+	+	+	+
8			-	-	-	+	+	+	+
8	Abóbora seca pescoço - *Cucurbita moschata* L.	*Cucurbitaceae*	-	-	-	+	+	+	+
8			-	-	-	-	-	+	+
9			-	-	-	+	+	+	+
9	Abóbora Tetsukabuto - *Cucurbita moschata* L.	*Cucurbitaceae*	-	-	-	+	+	+	+
9			-	-	-	+	+	+	+
10			-	-	+	+	+	+	+
10	Abóbora rajada - *Cucurbita moschata* L.	*Cucurbitaceae*	-	-	-	+	+	+	+
10			-	-	+	+	+	+	+
11			-	-	-	+	+	+	+
11	Chuchu - *Sechium edule* Swartz	*Cucurbitaceae*	-	-	+	+	+	+	+
11			-	-	+	+	+	+	+
12			-	+	+	+	+	+	+
12	Caqui - *Diospyros kaky* L.	*Ebenaceae*	-	+	+	+	+	+	+
12			-	+	+	+	+	+	+
13			-	+	+	+	+	+	+
13	Maçã gala - *Malus domestica* Borkh	*Rosaceae*	-	+	+	+	+	+	+
13			-	+	+	+	+	+	+
14			-	+	+	+	+	+	+
14	Pimentão - *Capsicum annuum* L.	*Solanaceae*	-	+	+	+	+	+	+
14			-	+	+	+	+	+	+
15			-	+	+	+	+	+	+
15	Tomate - *Lycopersicon esculentum* Mill	*Solanaceae*	-	+	+	+	+	+	+
15			-	+	+	+	+	+	+
16			-	+	+	+	+	+	+
16	Jiló - *Solanum gilo* Raddi	*Solanaceae*	-	+	+	+	+	+	+
16			-	+	+	+	+	+	+
17			-	+	+	+	+	+	+
17	Berinjela - *Solanum melongena* L.	*Solanaceae*	-	+	+	+	+	+	+
17			-	+	+	+	+	+	+
18			-	-	-	-	-	-	-
18	Batata - *Solanum tuberosum* L.	*Solanaceae*	-	-	-	-	-	-	-
18			-	-	-	-	-	-	-

(+) reaction pathogenic; (-) reaction is not pathogenic

Evaluation method

Using the equipment with the penetrometer tip 5 mm, we evaluated the firmness of the host. During the seven day period we evaluated the lesion length (mm) at intervals of 24 hours. From the measurements of lesion length, we obtained information of the incubation period. We calculated the parameter area under the lesion progress curve (AACPL). Aggressiveness was obtained from the values for lesion length of time. The virulence was observed by noting the presence or absence of symptoms (avirulent pathogen does not cause disease, virulent and causes disease - qualitative; virulent pathogens all have degrees of aggressiveness) (sensu Andrivon, 1993). We estimated the incubation period (number of days from inoculation to onset of symptoms) and determined the pathogenicity (presence or absence of symptoms) of the isolated genotypes studied.

Statistical analysis

It wasas performed analysis of variance (ANOVA) with variable firmness and AACPL using SAS software version of Windows. There was a correlation analysis between the firm and AACPL different hosts.

RESULTS AND DISCUSSION

We rejected the null hypothesis for the variables fruit firmness ($F_{17, 36}$ = 46.81 **) and AACPL ($F_{17, 36}$ = 28.76 **). Cucumber (conserves and green), eggplant and bell pepper had the highest lesion lengths differing from the other hosts tested. The carrot stood out by presenting a lower length of lesion, differing from the other. Importantly, organ morphology, cellular organization and the area of infection may relate to the progress of lesion growth and consequent disease progression.

The pathogen was avirulent and / or immune reaction developed or not to had host-specific the pathogen with potatoes and sweet potatoes. On the fifth day of evaluation, which hosts all had symptoms (Table 1). The pathogenicity to the hosts that were infected by the pathogen was confirmed for most, two days after inoculation (Table 1).

The hosts had lower incubation period (two days) were papaya, cucumber, pickled cucumbers, persimmons, apples, peppers, tomatoes, gilo and eggplant, while the squash neck showed the longest incubation period (5 days) (Table 2). They can therefore be considered as susceptible and resistant to rot fitóftora respectively. Some of the cultivars with shorter incubation periods, coincidentally, have the lowest average firmness (peppers, apples, tomatoes and eggplant), showing greater susceptibility to *P. capsici* (Table 3), indicating relationship of physical resistance to compression of the organs with the activity of parasitic pathogen.

Table 2. Incubation period (IP) and latency period (LP) during the evaluation presented in the host inoculated.

Hosts	Specie	Family	PI (sintoma) Frutos				PL (sinal) Frutos			
						µ*				**µ***
Cenoura (raiz)	*Daucus carotae* L.	*Apiaceae*	0	3	6	**3**	0	3	6	**3**
Mamão papaia (fruto)	*Carica papaya* L.	*Caricaceae*	2	2	2	**2**	3	3	3	**3**
Batata-doce (raíz)	*Ipomoea batatas* L.	*Convolvulaceae*	0	0	0	**0**	0	0	0	**0**
Maxixe(fruto)	*Cucumis anguria* L.	*Cucurbitaceae*	2	2	2	**2**	6	6	6	**6**
Melão Cantaloupe (fruto)	*Cucumis melo* L.	*Cucurbitaceae*	3	4	2	**3**	4	3	4	**4**
Pepino conserva (fruto)	*Cucumis sativus* L.	*Cucurbitaceae*	2	2	2	**2**	3	4	4	**4**
Pepino verde (fruto)	*Cucumis sativus* L.	*Cucurbitaceae*	3	3	3	**3**	4	3	3	**3**
Abóbora pescoço (fruto)	*Cucurbita moschata* L.	*Cucurbitaceae*	4	4	6	**5**	5	4	6	**5**
Abóbora Tetsukabuto (fruto)	*Cucurbita moschata* L.	*Cucurbitaceae*	4	4	4	**4**	0	0	4	**1**
Abóbora rajada (fruto)	*Cucurbita moschata* L.	*Cucurbitaceae*	3	4	3	**3**	5	6	4	**5**
Chuchu (fruto)	*Sechium edule* Swartz	*Cucurbitaceae*	4	3	3	**3**	6	4	4	**5**
Caqui (fruto)	*Diospyros kaki* L.	*Ebenaceae*	2	2	2	**2**	0	0	0	**0**
Maçã gala (fruto)	*Malus domestica* Borkh	*Rosaceae*	2	2	2	**2**	0	0	0	**0**
Pimentão (fruto)	*Capsicum annuum* L.	*Solanaceae*	2	2	2	**2**	5	5	3	**4**
Tomate verde (fruto)	*Lycopersicon esculentum* Mill	*Solanaceae*	2	2	2	**2**	0	3	3	**3**
Jiló (fruto)	*Solanum gilo* Raddi	*Solanaceae*	2	2	2	**2**	0	0	0	**0**
Berinjela (fruto)	*Solanum melongena* L.	*Solanaceae*	2	2	2	**2**	4	4	4	**4**
Batata (caule)	*Solanum tuberosum* L.	*Solanaceae*	0	0	0	**0**	0	0	0	**0**

*µ average fo day of IP and LP.

With the exception of sweet potatoes, kaki, apples, eggplant and potatoes, all other hosts showed development of superficial mycelium. The production of mycelium on the surface is an indication of the development of reproductive structures that trigger the disease cycles (Agrios 1997, Bergamin Filho et al., 1995) that may develop in the field. This mycelium can serve as a source of inoculum in the field and cause symptoms in the host in post-harvest and production field. The cucumber and papaya had the largest (six days) and shorter (three days) period of latency, respectively (Table 2).

Some diseases when infected by obligate parasites exhibit host specificity (Agrios 1997), and consequently the epidemiological parameters are similar due when several populations of pathogens infect a single species or a host of variants. The latent period of incubation and showed differential reaction between the plant families studied. Cucurbitaceae and Solanaceae families had vallues incubation period ranging from two to five days and zero to two days, respectively (Table 2). Since the latent period had their vallues days variations in one to six days and zero to four days, respectively (Table 2). The host plant with the highest vallue in days of incubation period was the neck pumpkin (*C. moschata*) and with the highest average of the latent period was followed by pumpkin gherkin neck (Table 2). Some hosts did not produce (fungal reproductive structures on the surface of the had host-specific represented by sweet potatoes, kaki, apples gala, gilo, potato. only those host was verified fitoftora rot symptoms.

Table 3. Medium firmness (kgf) and area under the curve of progress of the lesion (AACPL) in the inoculated hosts.

Host	Species	Family	Firmness*		AACPL*		r**
Abóbora seca pescoço	*Cucurbita moschata* L.	*Cucurbitaceae*	13,4	a	8,5	fg	0,9951
Abóbora Tetsukabuto	*Cucurbita moschata* L.	*Cucurbitaceae*	10,5	b	2,6	fg	**-0,5000**
Batata-doce	*Ipomoea batatas* L.	*Convolvulaceae*	10,0	b	0,0	g	SC
Melão Cantaloupe	*Cucumis melo* L.	*Cucurbitaceae*	8,3	bc	16,6	ef	0,0459
Abóbora rajada	*Cucurbita moschata* L.	*Cucurbitaceae*	7,4	c	30,9	cd	0,9991
Cenoura	*Daucus carotae* L.	*Apiaceae*	7,0	cd	4,8	fg	**-0,8678**
Maxixe	*Cucumis anguria* L.	*Cucurbitaceae*	4,4	de	21,3	de	**-0,6932**
Jiló	*Solanum gilo* Raddi	*Solanaceae*	4,3	e	27,6	cd	**-0,7328**
Batata	*Solanum tuberosum* L.	*Solanaceae*	4,3	e	0,0	g	SC
Pepino conserva	*Cucumis sativus* L.	*Cucurbitaceae*	4,0	e	47,6	a	**-0,9642**
Pepino verde	*Cucumis sativus* L.	*Cucurbitaceae*	3,6	e	46,5	ab	0,5385
Chuchu	*Sechium edule* Swartz	*Cucurbitaceae*	3,2	e	23,4	de	**-0,9958**
Caqui	*Diospyros kaki* L.	*Ebenaceae*	3,1	e	24,1	de	**-0,0930**
Berinjela	*Solanum melongena* L.	*Solanaceae*	2,9	e	46,3	ab	**-0,9996**
Mamão papaia	*Carica papaya* L.	*Caricaceae*	2,8	e	15,5	fg	**-0,7143**
Tomate	*Lycopersicon esculentum* Mill.	*Solanaceae*	2,7	e	29,3	cd	0,7384
Maçã	*Malus domestica* Borkh	*Rosaceae*	2,5	e	29,9	cd	0,2602
Pimentão	*Capsicum annuum* L.	*Solanaceae*	1,9	e	43,1	bc	0,3535

* Values followed by same letter vertically do not differ by Tukey test (P ~ 0.05). ** the Pearson correlation coefficient (r) was obtained from the values of firmness and AACPL repetitions.

Pumpkin dry neck, Tetsukabuto pumpkin, sweet potato and melon cataloupe had the highest average firmness, differing from the other. Since the lowest values of firmness were obtained for pepper, apple gala, tomato and papaya (Table 3, Figure 1). The Gherkin (conserves and green), eggplant and bell pepper had the highest average AACPL (increased susceptibility to infection), differing from the other. The lower values of AACPL (greater resistance to infection) were found by genotypes Tetsukabuto pumpkin, carrots, squash and papaya neck (Table 3, Figure 1). Through the significance levels presented by the Tukey test and shown in Table 3 and Figure 2, we can indirectly confirm the initial hypothesis of the work for the fruits of pepper (highest amount of disease and firmness - increased aggressiveness of the pathogen), in analyzing in a manner contrary to the working hypothesis was confirmed for pumpkin and squash Tetsukabuto dry neck (greater firmness and smaller amount of disease - less aggressiveness of the pathogen).

The relationship between the values of firmness and the values of all the host AACPL analyzed showed that with increasing firmness of organs reduces the susceptibility of up to 58% (r **=- 0.5796). So when we relate the firmness with individual susceptibility to disease in the organs of the host tested is not an absolute truth for all hosts tested as host for 50% of the hypothesis was confirmed.

The carrot, papaya, cucumber conserves, chayote, eggplant and eggplant showed a correlation coefficient (r) negative, with greater than 70% indicating an inverse relationship, and expect. Cucumber, chayote and eggplant showed a correlation greater than 96%. The highest value was found in eggplant (99.96%), so as you increase the firmness of the fruit reduces the susceptibility to 99.96% in fruits of aubergine (Table 3). This may be a promising trait in breeding programs aiming to reduce damage by pathogens in post-harvest conditions.

Among the Solanaceae *P. capsici* showed more aggression in eggplant (Figure 1) between the cucurbit pathogen was more aggressive on cucumber green (Figure 1) and among the other families was more aggressive in apples (Figure 1).

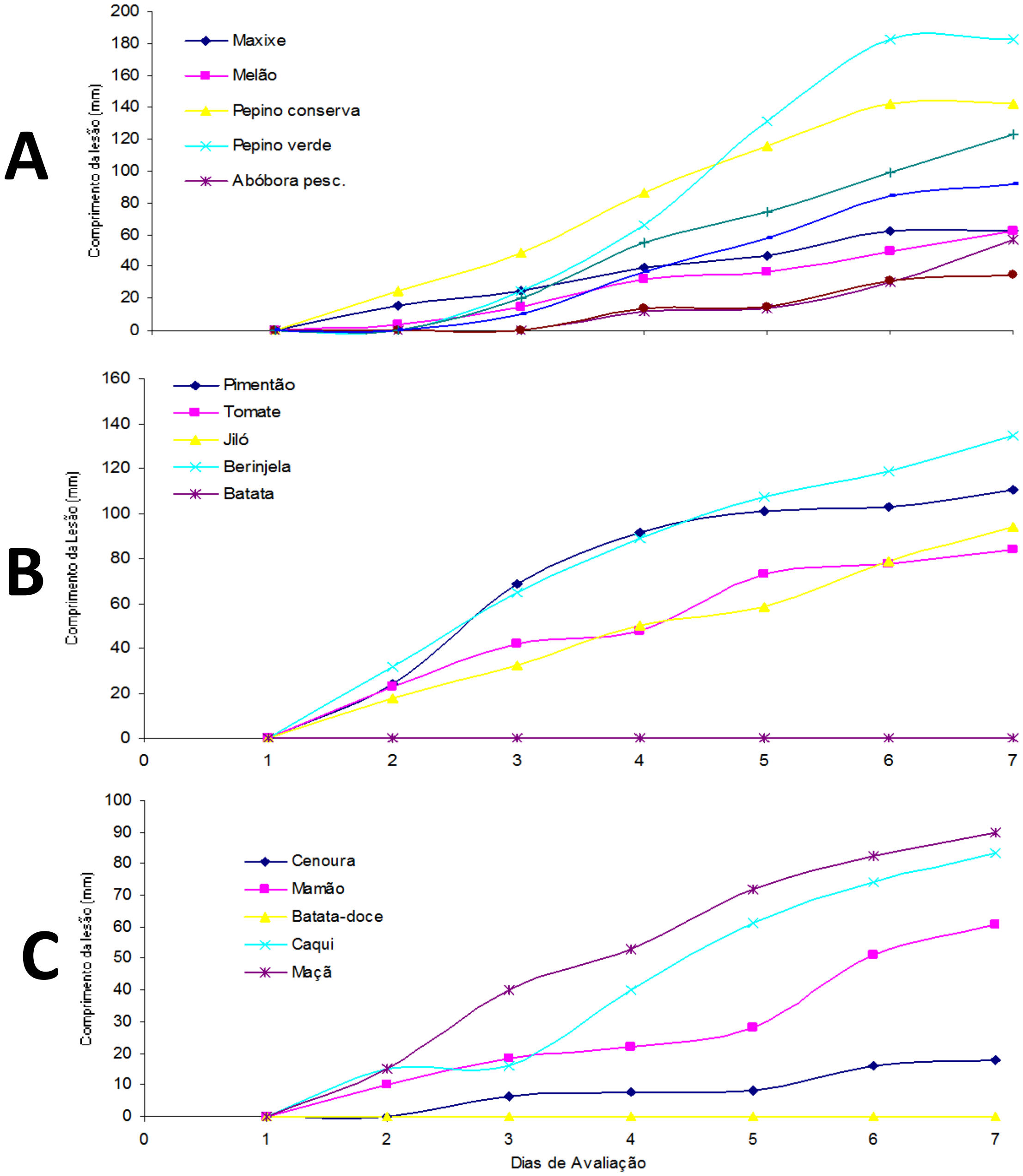

Figure 1. Temporal progress of the lengths of lesions produced by members of the family Cucurbitaceae (A), Solanaceae (B) and other plant families (C).

Cucurbits in the critical period for raising the growth rate of the disease is three days to one day the Solanaceae, and in the case of other plant families ranged from one to three days. However, the lesion length was 31 mm.day^{-1} for green cucumber, 24 mm.day^{-1} cucurmber conserves, 22 mm.day^{-1} eggplant, 19 mm.day^{-1} pepper, 15 mm.day^{-1} gala apple , 14 mm.day^{-1} eggplant, 13 mm.day^{-1} tomato, 13 mm.day^{-1} khaki, 10 mm.day^{-1} gherkin, 9 mm.day^{-1} papaya, 9 mm.day^{-1} melon , 8 mm.day^{-1} a pumpkin-dry neck, 3 mm.day^{-1} carrot, zero mm.day^{-1} for sweet potatoes and potatoes.

The fungus *P. capsici* showed less aggression in Tesukabuto pumpkin, carrots, squash and papaya neck, hosts who had the lowest average AACPL and highest average firmness (Table 3, Figure 2). And the biggest area of injured tissue was found in cucumber (fresh or tinned), eggplant and pepper (Figure 2B).

Cucumbers (conserves and green) were 100 % infected fruit after seven days of inoculation. The appearance of gum infections was observed in the pumpkin. The sweet potato showed immune reaction, and after seven days of germination showed that inoculation with the issuance of rootlets. The pumpkin and carrot Tetsukabuto *P.capsici* showed resistance.

Farr and Rosman (2007) did not show any record of the occurrence of *Phytophthora capsici* infecting carrot, papaya, cucumber, chayote, persimmon, apple, in Brazil, but has recorded occurrence of *P. capsici* infecting carrot in the U.S., the U.S. papaya, chayote in Costa Rica and persimmons in Italy. And in this same database has recorded the occurrence of several species of *Phytophthora* infect many hosts, such as in carrot (*P. cactorum, P. megasperma* and *P. nicotianae*) in papaya (*P. cactorum, P. capsici , P. cinnamomi, P. citrophthora, P. faberi, P. nicotianae, P. palmivora, P. parasitica* and *P. tropicalis*), melon (*P. capsici, P. citrophthora, P. drechsleri, P. Meloni, P . nicotianae* and *P. parasitica*) in cucumber (*P. cactorum, P. capsici, P. cryptogea, P. drechsleri, P. megasperma, P. Meloni, P. nicotianae* and *P. sinensis*) in pumpkin (*P. capsici* and *P. cryptogea*) in chayote (*P. capsici, P. nicotianae* and *P. tropicalis*) in persimmon (*P. cactorum, P. capsici* and *P. citrophthora*) in apple (*P. cactorum, P. cambivora, P . cryptogea, P. drechsleri, P. gonapodyides, P. megasperma* and *P. syringae*) on pepper (*P. cactorum, P. capsici, P. citrophthora, P. cryptogea, P. drechsleri, P. infestans, P. nicotianae , P. palmivora* and *P. parasitica*) in tomato (*P. arecae, P. cactorum, P. capsici, P. cinnamomi, P. citricola, P. citrophthora, P. cryptogea, P. drechsleri, P. erythroseptica, P . fragariae, P. winter, P. infestans, P. lycopersici, P. megasperma, P. mexicana, P. nicotianae, P. palmivora, P. parasitica, P. phaseoli, P. verrucosa* and *P. terrestris*) in eggplant (*P. capsici*) and finally in eggplant (*P. arecae, P. cactorum, P. capsici, P. cryptogea, P. drechsleri, P. winter, P. infestans, P. Irani, P. meadii, P. megasperma, P. melogenae, P. nicotianae, P. palmivora, P. parasitica, P. phaseoli, P. taihokuensis* and *P. terrestris*).

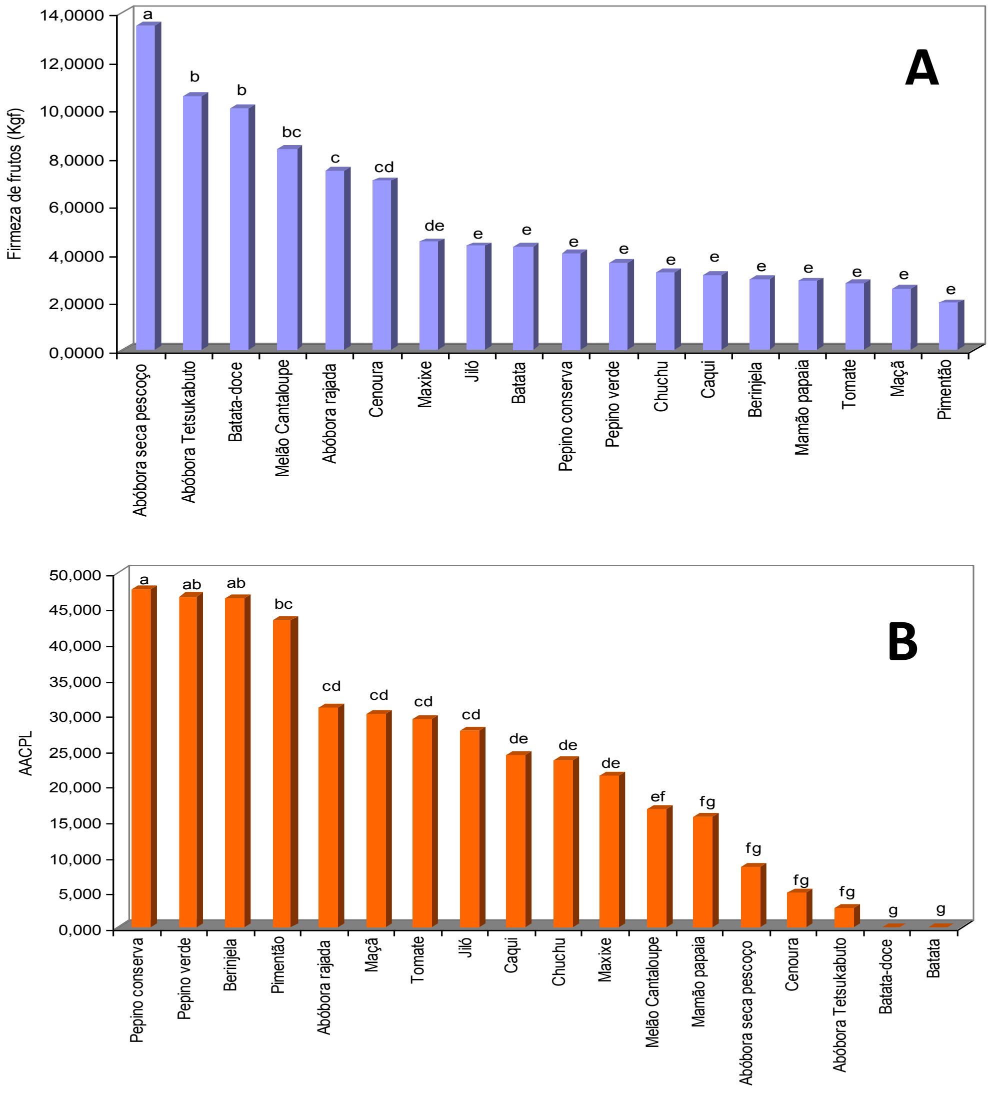

Figure 2. Mean firmness (A) and areas under the disease progress curve (B) of the hosts examined.

In the database of Cenargen (2007) - database of incidence of fungi on plants in Brazil, there was no records of occurrence of *P. capsici* infecting carrot, papaya, cucumber, chayote, Khaki and apple. And in this same database has been recorded in many localities the occurrence of *Phytophthora* species on various hosts tested, such as in papaya (*P. parasitica, P. palmivora* and *P. nicotianae*), melon (*P. capsici*) ; in cucumber (*P. capsici*) on squash (*P. capsici*) in apple (*P. cactorum, P. cryptogea, P. sojae* and *P. drechsleri*) in pepper *(P. capsici* and *P. infestans*) in tomato (*P. capsici, P. infestans, P. nicotianae, P. palmivora* and *P. parasitica*) in eggplant *(P. capsici* and *P. parasitica*), eggplant (P. capsici, P. infestans, P. nicotianae and *P. palmivora*) in carrot is not specified the species identified, in cucumber, chayote and khaki was not found any record of occurrence of *Phytophthora* spp.

CONCLUSIONS

This work has established that the strength of plant organs is related to susceptibility to *P. capsici*. This is the first study dealt with the firmness of fruit with the susceptibility of *P. capsici* in Brazil. New records were checked under artificial conditions.

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