

SHORT RESEARCH ARTICLE

Main pests and diseases affecting black pepper in family production systems in Capitão Poço, Pará, Brazil

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ABSTRACT

One of the main problems faced by black pepper crop in the state of Pará is the phytosanitary attack that, if not controlled and / or avoided, can cause serious damages to the crop, causing productivity and financial losses for family farmers. In the city of Capitão Poço, state of Pará, pipericultura is one of the activities that contributes to complement the income of family producers, since they also work with other agricultural species. This study aimed to make a survey of the main pests and diseases most commonly found in black pepper crop by reflecting on the control methods used by family farmers in the city of Capitão Poço/PA. To collect the information, a semi-structured questionnaire was applied to 50 family farmers in the municipality, in order to identify the main phytosanitary problems faced by family producers during the cultivation of black pepper and the most used forms of control. The most common pests and diseases are aphids (70%) and mealybugs (8%) and fusarium (80%) and bacterial halo (14%) respectively, and the use of chemicals is the main form of control used. The need for the use of new techniques that minimize and / or replace chemical control is notorious, and public and private institutions may be acting in this direction, with the development of research and its dissemination, presenting other prevention and control alternatives that can be used. meet the wishes of the municipality's producers.

Highlighted Conclusions

1. The main pests and diseases that attack the cultivation of black pepper are aphids, mealybugs, fusariosis and burning wire, using the chemical method of control.
2. It is necessary to use alternative and more sustainable techniques for pest and disease prevention and control and public and private institutions may be acting with the producers of the municipality in this aspect.

INTRODUCTION

Originated from India, black pepper (*Piper nigrum* L.) is one of the main agricultural products in the Amazon region's export agenda, making Brazil the fourth largest producer in the world, especially in the form of black pepper, which is the main marketing product (Andrade et al. 2017). About 85% of national production comes from family farming, generating 30,000 direct jobs during the year, and reaching 80 thousand at harvest time. It has high economic value and is widely used in agroindustry, food and chemical industry (Assis et al. 2015).

In the state of Pará, black pepper has been cultivated since the 1950. The favorable soil and climate conditions for its development have made it one of the main economic activities of Pará agriculture (Filgueiras et al. 2009). One of the main problems faced by black pepper crop in the state is the phytosanitary attack that if not controlled and/or avoided can cause serious damage to the crop, causing loss of productivity and financial for family farmers.

In this sense, Pará is the largest producer of this spice, having the municipality of Capitão Poço a significant representation in this scenario. In that city, pipericultura is one of the activities that contributes to complement the income of family producers, since they also work with other agricultural species.

Even though it is an important crop in terms of socioeconomic aspects, studies that present the bottlenecks in phytosanitary terms that affect the cultivation of black pepper of small producers of the municipality still need to be developed, since the lack of research on the subject also reveal the lack of knowledge about this.

In this sense, the present study aimed to make a survey of the main pests and diseases that occur in the black pepper crop, reflecting on the control methods used by family farmers in the city of Capitão Poço, PA, Brazil.

MATERIAL AND METHODS

The field research was carried out from December 2018 to January 2019, with family producers who cultivate black pepper in the city of Capitão Poço / PA. In this city, the pepper is predominantly worked by small producers who have the pipericulture as one of the family incomes generating activities.

The city of Capitão Poço is located at a latitude of 01°44'47 "S and a longitude of 47°03'34" WGr., belongs to Microregion of Guamá, northeastern mesoregion of Pará and is 226km from the capital Belém, with an average annual temperature of 26.2 °C and according to the Köeppen classification the Ami type climate (Silva et al. 2011), with annual precipitation around 2,500 mm and relative air humidity between 75% and 89%, in the months with the lowest and highest precipitation, respectively (Schwart 2007).

The research was developed based on the application of a semi-structured questionnaire in order to identify the main phytosanitary problems faced by family farmers during the cultivation of black pepper, the most used forms of control, thus reflecting on this problem and proposing alternatives that will minimize the damage caused by these phytopathogens. For this, 50 producers who work directly with this crop were randomly interviewed.

In the course of the study, in addition to the questionnaire, we also used audio recording, notes in field notebooks and direct and indirect observations that served as support for information collection and subsequent research rationale.

Data were organized in a Microsoft Excel 2013® spreadsheet, where they were manipulated to elaborate the table. Finally, the interpretation and analysis of the qualitative information obtained was performed.

RESULTS AND DISCUSSION

Table 1 presents the main phytosanitary problems that occur in the peppers of small producers in the municipality.

Table 1. Main pests that attack black pepper in family production systems in Capitão Poço, PA, Brazil.

Black pepper pests	Incidence (%)	
	Diseases	Pests
Rod drill	-	8
Aphids	-	70
Mealybugs	-	18
Others	-	4
Black pepper diseases		
Fusarium	80	-
Withered yellow	14	-
Burning wire	2	-
Anthraxnose	2	-
Others	2	-
Total	100	100

The most common pests are aphids and mealybugs. The incidence of these phytopathogens is about 70 and 18% respectively. The attack of these pests account for a total of 88% of the damage caused to black pepper crop, which if not controlled, can cause significant damage, causing serious productivity losses.

Aphids infest all stages of pepper development, especially in the rainy season. These suck the sap of the leaves and buds, causing curling and difficulty of plant development, especially at the beginning of growth. Mealybugs-infested plants, on the other hand, may wither, dropping buds and leaves, and even die. Their attacks are more common in poorly tended crops and with the adoption of wrong cultural treatments (Lemos et al. 2014).

According to Tremacoldi (2010), among the diseases that attack the black pepper crop, the ones that cause the greatest economic damage to farmers are root fusarium or rot (*Fusarium solani* f.sp. *piperis*) and withered yellow

(*Fusarium oxysporum*). However, there are other diseases that cause less damage to the pepper plants such as wire burn (*Koleroga noxia*) and anthracnose (*Colletotrichum gloeosporioides*).

The most significant diseases in black pepper crop are fusarium and aureolated stain, representing about 80 and 14% respectively.

Fusarium is a serious disease that can do a lot of damage to a black pepper, with an annual reduction of 3% in cultivated area and production. As a consequence, the crop cycle, which lasts an average of 12 years, has changed and become shorter, with an average of five to six years of survival in the area of disease occurrence (Lemos et al. 2011). This makes the maintenance of the crop very difficult, especially for family farmers, who do not have the return due to the high investment made in planting, because there are no resistant commercial cultivars or effective chemical control for the disease. The disease causes root rot, yellowing and leaf wilting, which fall to the ground or necrotize and become attached to the season.

Withered yellow, while occurring in only a few cultivars, can cause a pepper to die in a short time because it spreads rapidly among plants. The main symptoms are discoloration of the stem and branches and yellowing and leaf fall and triangular lesions appear on the branches in the knot region, necrosing only one side of the stem, becoming half green and half black (Lemos et al. 2014).

When asked about the control methods used, all farmers pointed to chemical control as a way to combat phytopathogens. To date, there is no effective chemical treatment against Fusarium or commercial fusarium-resistant black pepper cultivars (Tremacoldi 2010). However, alternative methods or products have been partially tested in order to take advantage of their antibiotic activities (fungicides and fungistatic) in the control of plant diseases. The search for alternative methods / products for disease management, replacing conventional methods, has been increasing in recent years, due to the harmful effects that pesticides cause to the environment and human health. Thus, studies for the control of fusarium using alternative methods are concerned with the strategies of modern agriculture and are directed towards economic and ecological interests.

In this context, the need for the development of new alternative control techniques is noticeable, since the use of agrochemical causes a series of impacts and imbalances both for the environment and for those who manipulate these substances.

It is in this scenario that public and private institutions could presently develop and foster the use of more sustainable alternatives for control and / or prevention, with the adoption of Integrated Pest Management (IPM), the use of natural syrup (the neem stratum that still needs much research that prove the effectiveness of fusarium control and even biological control since these practices would bring greater balance in the production system and better welfare for producers.

In addition, care in the production/acquisition of seedlings and management of peppers, as well as the adoption of practices aimed at diversifying production would be strategies that could act in a preventive manner in order to minimize pest attack and disease outbreaks the main strategy that must be adopted. A nutritionally balanced system combined with factors such as management and other practices can contribute to reducing the appearance of these problems in the cultivation of black pepper.

The use of varieties resistant to pest and disease attack generally reveals positive impacts on both economic, social and environmental aspects, however, farmers need more information and access to this technology.

In this sense, it was found that the main pests and diseases that attack the cultivation of black pepper were aphids, mealybugs, fusarium and burning wire, being the chemical control method the one used predominantly since this is the more accessible to producers.

Thus, the need for the use of new techniques that minimize and/or replace the chemical control is notorious and the public and private institutions may be acting in this direction, with the development of research and its disclosure, presenting other prevention alternatives and control that meet the wishes of the municipality's producers.

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