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Survey and Identification of Major Insect Pests of Seed Spices in Ethiopia

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ABSTRACT

Insect pests inflict damage to humans, farm animals and crops. Subsistence cash crop production is essential for the growing population of Africa. Seed spices occupy an important place for their flavoring, culinary uses and essential oil derivatives. Survey was conducted in major growing areas of Ethiopia during 2016 and 2018 main cropping season with an aim of identifying problematic insect pests and providing baseline information on pests of black cumin, fenugreek, coriander and white cumin in different agro-ecologies of Ethiopia. Samples were randomly collected from insect infested plants from each study location for laboratory inspection. Specimens of unidentified insects were kept in vials containing ethanol for identification. All specimens were classified into their respective orders, families, genera and species. Generally, the result revealed that pod borer was a common insect pest on black cumin and fenugreek and aphid was a common insect pest recorded on fenugreek. Management study which solves the problem of insects on seed spice must be designed in the future on pod borer, aphids, cut worm and leaf minor.

INTRODUCTION

Insects are the most diverse species of animals living on earth. Insects are undoubtedly the most adaptable form of life as their total numbers far exceed that of any other animal category (Mohamed and Sallam, 2011). The majority of insects are directly important to humans and the environment. For example, several insect species are predators or parasitoids of other harmful pests; others are pollinators, decomposers of organic matter, or producers of valuable products such as honey or silk. Some can be used to produce pharmacologically active compounds such as venoms or antibodies. Less than 0.5 percent of the total number of known insect species are considered pests, and only a few of these can be a serious menace to people. Insect pests inflict damage on humans, farm animals, and crops. Subsistence cash crop production is essential for the growing population of Africa. In Ethiopia highland seed spices are produced in

different areas. But till now detailed assessments of insect pests are not undertaken in different parts of the country. So, the objective of this study was to identify major insect pests of seed spices and know their distribution across the country.

MATERIAL AND METHODS

Study site and materials

The study was conducted at different locations namely; Shirka, Hela Zembaba, Birbof Chole, Hela Tereta, Akaki, Chafe Donsa, Bishoftu, Goro, Ginir, Gololcha, Sirinka, Takusa, Chefa, Dembia and Wolkite from 2016 to 2018. The quadrant to sample the spice population, sample bag to collect the unidentified pest and refrigerator to keep the specimen was used during the survey.

Insect identification

A survey for the insect pest of major seed species of Ethiopia was conducted from October 2016 to November 2016 and October 2018 to November 2018 for two years. Potential seed spices-producing regions of Ethiopia (Oromia, Amhara, and SNNPRS) were surveyed for the occurrence of the insect pests. A stratified random sampling technique was employed to sample regions, woredas, and zones. Each woreda survey field was selected from the farmer's field. From each zone, six small-scale producers were selected after getting the name of the producers and size of production data from the Bureau of Agriculture (BOA), and applying a random sampling technique to sample the field. From each field, a bunch was sampled randomly by using "X" path, when the plantation was sole and followed standard recommended cultivation. Each stand was divided into three strata (near the ground level, at the middle and at the top) to sample the leaves. From each stratum, four leaves were selected. Totally 12 leaves were sampled from each stand to record the severity and incidence of insect damage around the pest foci, in order to collect the insect at any of its growth stages (larva, pupa, or adult). Infected spices were diagnosed for characteristic internal and/or external symptoms of the pest attack and the incidence and severity of the damages it caused was recorded. Besides, information related to the history of the field, such as type of crops and/or cultivars grown, planting year (estimated age), types of cultural practices and previous cropping system of the field was recorded.

RESULTS AND DISCUSSION

From the survey result, we observed that many insects affect seed spices and contribute to yield losses occurring in the field. Oromia, Amhara, and South Nations Nationalities and People Regions were surveyed and the following results were obtained in the following table. This study is in line with Gopa L.

For instance, pod borer, aphids and leaf minor were the serious insects observed in all areas in addition to skeletonizer. From the table below we understand that pod borer, aphids, and cutworms were the major insect pests challenging the production of black cumin and fenugreek spices in the area.

CONCLUSION

On black cumin pod borer and aphid were found the common insect pests as the main production limiting factor and on coriander and fenugreek aphids were found the common insect pests as the main production limiting

factor. The results obtained may assist in developing an integrated control program for this insect pest identified. More detailed investigations should be carried out on the biology of insect pests. In the future, integrated pest management should be designed to manage these economically important insect pests.

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Table 1. The average insects observed during the survey on different spices at different locations.

Spice										Order	Family	Seed spice damaged part/s
Region	Study location	Black cumin Insect pests recorded	Damage (%)	Fenugreek Insect pests recorded	Damage (%)	Coriander Insect pests recorded	Damage (%)	White cumin Insect pests recorded	Damage (%)			
Oromia	Bishoftu	Pod borer	35	Pod borer	11	Pod borer	1	Pod borer	0	Hemiptera	Miridae	Pods
		Aphids	9	Aphids	15	Aphids	2	Aphids	3	Homoptera	Aphididae	Leaves and shoots
		Cutworm	10	Cutworm	4	Cutworm	1	Cutworm	1	Lepidoptera	Noctuidae	Seedlings
		Leaf minor	3	Leaf minor	2	Leaf minor	1	Leaf minor	0	Diptera	Agromyzidae	Leaf
	Chafe Donsa	Pod borer	25	Pod borer	9	Pod borer	0	Pod borer	0	Hemiptera	Miridae	Pods
		Aphids	6	Aphids	14	Aphids	1	Aphids	2	Homoptera	Aphididae	Leaves and shoots
		Cutworm	5	Cutworm	3	Cutworm	1	Cutworm	1	Lepidoptera	Noctuidae	Seedlings
		Leaf minor	2	Leaf minor	1	Leaf minor	1	Leaf minor	0	Diptera	Agromyzidae	Leaf
	Shirka (Hela Zembaba, Hela Tereta)	Pod borer	32	Pod borer	10	Pod borer	0	Pod borer	0	Hemiptera	Miridae	Pods
		Aphids	10	Aphids	17	Aphids	2	Aphids	2	Homoptera	Aphididae	Leaves and shoots
		Cutworm	10	Cutworm	2	Cutworm	0	Cutworm	0	Lepidoptera	Noctuidae	Seedlings
		Leaf minor	3	Leaf minor	1	Leaf minor	0	Leaf minor	0	Diptera	Agromyzidae	Leaf
	Kulumsa	Pod borer	20	Pod borer	7	Pod borer	0	Pod borer	0	Hemiptera	Miridae	Pods
		Aphids	6	Aphids	16	Aphids	3	Aphids	1	Homoptera	Aphididae	Leaves and shoots
		Cutworm	8	Cutworm	2	Cutworm	1	Cutworm	1	Lepidoptera	Noctuidae	Seedlings
		Leaf minor	3	Leaf minor	1	Leaf minor	1	Leaf minor	0	Diptera	Agromyzidae	Leaf
	Sinana	Pod borer	30	Pod borer	6	Pod borer	0	Pod borer	0	Hemiptera	Miridae	Pods
		Aphids	13	Aphids	12	Aphids	3	Aphids	2	Homoptera	Aphididae	Leaves and shoots
		Cutworm	5	Cutworm	2	Cutworm	1	Cutworm	1	Lepidoptera	Noctuidae	Seedlings
		Leaf minor	3	Leaf minor	2	Leaf minor	1	Leaf minor	0	Diptera	Agromyzidae	Leaf
	Bale Robe	Pod borer	15	Pod borer	6	Pod borer	0	Pod borer	0	Hemiptera	Miridae	Pods
		Aphids	8	Aphids	14	Aphids	3	Aphids	2	Homoptera	Aphididae	Leaves and shoots
		Cutworm	7	Cutworm	2	Cutworm	0	Cutworm	1	Lepidoptera	Noctuidae	Seedlings
		Leaf minor	2	Leaf minor	1	Leaf minor	1	Leaf minor	0	Diptera	Agromyzidae	Leaf
		Pod borer	12	Pod borer	5	Pod borer	0	Pod borer	0	Hemiptera	Miridae	Pods

	Jimma (Bashasha)	Aphids	7	Aphids	12	Aphids	2	Aphids	2	Homoptera	Aphididae	Leaves and shoots
		Cutworm	3	Cutworm	1	Cutworm	1	Cutworm	1	Lepidoptera	Noctuidae	Seedlings
		Leaf minor	2	Leaf minor	1	Leaf minor	0	Leaf minor	0	Diptera	Agromyzidae	Leaf
	Ginir	Pod borer	18	Pod borer	7	Pod borer	0	Pod borer	0	Hemiptera	Miridae	Pods
		Aphids	6	Aphids	13	Aphids	3	Aphids	1	Homoptera	Aphididae	Leaves and shoots
		Cutworm	7	Cutworm	2	Cutworm	1	Cutworm	1	Lepidoptera	Noctuidae	Seedlings
Amhara	Srinka	Leaf minor	2	Leaf minor	1	Leaf minor	1	Leaf minor	1	Diptera	Agromyzidae	Leaf
		Pod borer	18	Pod borer	5	Pod borer	0	Pod borer	1	Hemiptera	Miridae	Pods
		Aphids	9	Aphids	10	Aphids	2	Aphids	2	Homoptera	Aphididae	Leaves and shoots
		Cutworm	2	Cutworm	1	Cutworm	0	Cutworm	1	Lepidoptera	Noctuidae	Seedlings
	Dembia	Leaf minor	1	Leaf minor	1	Leaf minor	1	Leaf minor	0	Diptera	Agromyzidae	Leaf
		Pod borer	12	Pod borer	6	Pod borer	0	Pod borer	0	Hemiptera	Miridae	Pods
		Aphids	7	Aphids	10	Aphids	2	Aphids	1	Homoptera	Aphididae	Leaves and shoots
		Cutworm	2	Cutworm	2	Cutworm	1	Cutworm	1	Lepidoptera	Noctuidae	Seedlings
	Chefa	Leaf minor	1	Leaf minor	1	Leaf minor	1	Leaf minor	0	Diptera	Agromyzidae	Leaf
		Pod borer	16	Pod borer	5	Pod borer	0	Pod borer	0	Hemiptera	Miridae	Pods
		Aphids	10	Aphids	9	Aphids	2	Aphids	2	Homoptera	Aphididae	Leaves and shoots
		Cutworm	2	Cutworm	2	Cutworm	0	Cutworm	1	Lepidoptera	Noctuidae	Seedlings
	Takusa	Leaf minor	2	Leaf minor	2	Leaf minor	0	Leaf minor	0	Diptera	Agromyzidae	Leaf
		Pod borer	19	Pod borer	6	Pod borer	0	Pod borer	0	Hemiptera	Miridae	Pods
		Aphids	8	Aphids	12	Aphids	2	Aphids	2	Homoptera	Aphididae	Leaves and shoots
		Cutworm	2	Cutworm	1	Cutworm	1	Cutworm	1	Lepidoptera	Noctuidae	Seedlings
SNNPRS	Wolkite	Leaf minor	2	Leaf minor	1	Leaf minor	0	Leaf minor	0	Diptera	Agromyzidae	Leaf
		Pod borer	12	Pod borer	5	Pod borer	0	Pod borer	0	Hemiptera	Miridae	Pods
		Aphids	7	Aphids	13	Aphids	2	Aphids	2	Homoptera	Aphididae	Leaves and shoots
		Cutworm	1	Cutworm	2	Cutworm	1	Cutworm	1	Lepidoptera	Noctuidae	Seedlings