Okra Production Constraints and Awareness of Seed-Borne Fungi Infection in Ten Major Okra Growing Communities of the Ashanti Region of Ghana

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Authors’ contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAAR/2021/v15i430157

Received 10 April 2021
Accepted 15 June 2021
Published 18 June 2021

ABSTRACT

Okra production is one of the major sources of livelihood for the majority of farmers in the Ashanti region of Ghana. In view of this a survey was conducted among okra farmers in 10 major okra growing communities in Ashanti region of Ghana namely Mankranso, Mfensi-Adankwame, Beposo, Abompe, Kotokuom, Nkwanta-Kesse, Atwima Mim, Abaesua, Offinso and Nerebehi between October, 2017 and March, 2018 to assess their production constraints and awareness of seed-borne fungi infection menace and it management in okra. Data were obtained from 100 okra farmers selected using multi-stage sampling procedure through the use of structured questionnaire and interviews. Data obtained were analyzed using Statistical Package for Social Science (SPSS) for Windows. Descriptive statistics were used and means were presented using tables and graphs. There was a clear dominance of male (75%) as against female (25%). Ninety-one percent (91%) of the farmers were married. Fifty four percent (54%) had basic education and 43% had no formal education. Approximately, 42% of the farmers have been in okra production for over 10 years. Fifty three percent of the farmers intercropped okra with other vegetables. Majority (38%) of the farmers cultivated okra from two to three hectares. Most of the farmers (34%) ranked pest

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infestation followed by diseases (24 %) as the major constraints of okra production. Majority (77 %) of the farmers were not aware of seed-borne fungi of okra and therefore most (73 %) of them did not manage the infection. Farmers should therefore be educated by extension officers on seed-borne fungi to create their awareness of the seed-borne infection in the study areas for effective management.

Keywords: Okra; pest infestation; diseases; seed-borne fungi; intercropped.

1. INTRODUCTION

Okra (Abelmoschus esculentus (L.) Moench) is an annual crop and a member of the Malvaceae family which is generally grown in the tropical and subtropical parts of the world. It is primarily grown as a vegetable crop for its young fruits or pods [1]. Okra is one of the most frequently and commonly consumed traditional vegetables due to its robust nature, dietary fibers and distinct seed proteins which are balanced in both lysine and tryptophan amino acid it provides to diet. As at 2017, the world’s okra production stood at 8,900,434 tons with India as the largest producer followed by Nigeria, Sudan, Mali, Pakistan, Côte d’Ivoire, Cameroon and the eight being Ghana. Okra production in Ghana has an increasing trend. In years of 2010, 2013 and 2017, Ghana produced 50000, 63860 and 66458 tonnes of okra respectively [2].

Okra is primarily seed propagated; hence to attain large yields, the seeds must be healthy, pathogen and disease-free. Therefore, a healthy seed is the foundation of a healthy plant, an essential condition for good yield [3].

Infection of okra seeds by pathogenic fungi may cause failure of germination and diseases such as seedling blight. Incidence of Fusarium moniliforme (J. Sheld) and Colletotrichum dematium on okra seeds have been reported in Ghana [4].

Farming is a business and therefore should be managed from a business viewpoint with the ultimate goal of increasing profit. All activities in the farming process should therefore be carried out in an efficient manner. However, the okra farmers are faced with production challenges. To fully realize the benefits of okra production, farmers should be aware of the production constraints and seed-borne fungi infections and to ascertain their suitable management strategies for a suitable okra production and improved yield. In fact, okra production is one of the major sources of livelihood for the majority of farmers in the Ashanti region of Ghana. It could also be one of the major sources of foreign exchange earner for the Ghanaian economy if proper and effective agronomic practices are ensured. According to the National Agricultural Research Project [5] 10-15 t/ha of okra yield could be obtained under good management including seed-borne fungi infections management. However, information is inadequate on farmers’ awareness of seed-borne fungi infection and its management in okra. If farmers are aware of these seed infections and appreciative of their damage potential, it would greatly facilitate adoption of recommended management strategies.

The main objective of this study was to document okra production constraints and farmers' knowledge of seed-borne fungi of okra.

The specific objectives were to;

(i) determine okra production constraints and
(ii) assess okra farmers’ awareness of seed-borne fungi of okra and their management practices

2. MATERIAL AND METHODS

2.1 Study Area

The studied area is Ashanti Region of Ghana which is located between 0.15W and 2.25W longitudes, and between 5.50N and 7.46N latitudes. It shares boundaries with Brong-Ahafo Region in the North, Eastern Region in the East, Central Region in the South and Western Region in the South West. It occupies a land area of 24,389 Km^2 which represents 10.2 % of the overall land area of the country [6].

The region experiences bimodal rainfall pattern, with highest amount in May/June and October for the major and minor seasons, respectively. The mean annual rainfall in the region ranges from 1100 to 1800 mm. It has an average annual temperature of 25.5 °C in the southern parts and 32°C in the northern part. The region has a mean annual humidity of about 85.0 % in the southern parts and 65.0 % in the northern part [7]. The region has a moist Semi-deciduous Forest
vegetation cover in the southern part whereas the northern part occupies the Forest Transition which consists of short deciduous and fire tolerant trees such as the baobab (*Adansonia digitata*). Moreover, riverine forests occur along the Afram River and streams of the Savanna zone [6]. Soils in Ashanti Region are generally Acrisols. Okra production is an important farming activity in the region [7].

2.2 Farmers’ Socio-demographic Characteristics, Production Constraints, Awareness of Okra Seed-Borne Fungi Infection and its Management

A survey was conducted in November 2017 using the multistage sampling technique to select the farmers. The study started with purposive selection of the surveyed communities in consultation with the major okra fruit sellers in the markets of Kumasi Metropolis in the Ashanti Region where the majority of commercial okra farmers in Ashanti Region sell their produce. A total of ten communities, namely Mankranso, Mfensi-Adankwame, Beposo, Abompe, Kotokuom, Nkwanta-Kesse, Atwima Mim, Abavasua, Offinso and Nerebehi were selected. In the second stage of sampling, the names of active okra farmers were listed in the households. Ten active okra farmers were randomly selected from each community using lottery method. Farmers were interviewed individually using both close and open-ended questionnaires. Socio-demographic characteristics, production constraints and awareness of seed-borne fungi infection and its management of farmers were collected.

2.3 Statistical Analysis

The data collected were analyzed using Statistical Package for Social Science (SPSS) for Windows. Descriptive statistics were used and means were presented using tables and graphs.

3. RESULTS AND DISCUSSION

3.1 Gender, Marital Status and Educational Level of Okra Farmers in the Surveyed Communities

Out of the 100 okra farmers interviewed, clear dominance of male (60 - 90 %) was noted against female (10 – 40 %). Kotokuom and Nkwanta-Kesse had the greatest percentage (90 %) of male dominance while Nerebehi recorded the least percentage (60 %) (Table 1). Such dominance of the male farmers could be ascribed to the labourious task involved in okra production and the role of male farmers as land owners as also observed by [8]. More so, greater number of women work with their husbands on family farms and also due to the intensive work involved in okra production which agrees with the findings of [9].

The married respondents ranged from 80 to 100 %. The highest percentage (100 %) of married respondents were recorded at Mankranso, Abompe and Atwima Mim while the leasts (80 %) were recorded at Nkwanta-Kesse and Offinso (Table 1). Greater percentage of the respondents was married. This relatively large proportion of respondents being married could lead to large household sizes which is a cheaper and highly affordable means of providing farm labour and reducing labour costs [10].

Farmers who had no formal education ranged from 20 to 60 % with Mankranso, Abompe and Atwima Mim registering the highest percentage (60 %) while Kotokuom and Offinso the least one. Kotokuom registered the highest percentage (80 %) of respondents with basic education while Mankranso, Beposo and Atwima Mim recorded the least (40 %). Respondents who had secondary education were recorded only at Mfensi-Adankwame (10 %) and Offinso (20 %). None of the respondents in the surveyed communities had tertiary education (Table 1). Most of the farmers had basic education. This relatively large proportion of farmers with basic education could enhance the managerial and technical skills of the farmers [11]. Education is believed to increase the farmer’s ability to utilize existing technologies to attain higher efficiency [12].

3.2 Number of years, cropping systems and farm sizes of respondents in okra production in the surveyed communities

From the survey, we noted that okra farmers’ experiences varied in years. Farmers who are in okra production from one to three years ranged from 10 to 30 %. Nerebehi recorded the highest percentage (30 %) while the least percentages (10 %) of respondents in this category were recorded by Mankranso, Beposo, Kotokuom, Nkwanta-Kesse and Offinso (Fig.1). The highest percentage (30 %) of farmers who have cultivated okra from four to six years was recorded at Abompe and Atwima Mim while the
least ones were recorded at Mankranso, Kotokuom and Nkwanta-Kesse (Fig.1). Farmers who have cultivated okra from seven to nine years represented 10 to 40%. The highest percentage (40%) of farmers in this category was found at Beposo while the least one (10%) was registered at Atwima Mim, Offinso and Nerebehi (Fig.1). Moreover, the percentage of farmers who have produced okra for more than 10 years ranged from 20 to 60% with Nkwanta-Kesse and Offinso recording the highest percentage (60%) compared to 20% noted at Abompe (Fig.1). A high percentage of the respondents have been in okra cultivation for more than ten years. This infers that the majority of the respondents are well experienced in the okra production. Farming experience contributes positively to increase productivity.

Farmers (30 – 80%) intercrop okra with other vegetables (Fig.2) with the highest percentage (80%) found at Abaesua and the least (30%) recorded at Kotokuom. The percentage of respondents who practiced okra sole cropping ranged from 20 to 70% (Fig.2) with the highest percentage (70%) recorded at Kotokuom and the least percentage (20%) found at Abaesua.

Farmers who have cultivated the same crop over a long period of time are able to make accurate prediction on when to sow, the inputs to use, the quantity to use as well as the timing to use these inputs and therefore are more efficient in use of these inputs as compared to inexperienced farmers [13]. The continuous okra cropping by the respondents could also be ascribed to the fact that okra production is their source of livelihood.

This study revealed that most of the farmers cultivated okra as mixed culture with other food crops (Fig.2). This practice has some advantages such as maintenance of soil fertility, increased income, proper utilization of land, control of weeds, diseases and insect pests [14].

Fig. 3 presents the farm sizes of respondents in the surveyed communities. Majority of the farmers (20 – 60%) across the communities have their farm sizes ranging from two to three hectares with the highest percentage (60%) recorded at Abaesua and the least percentage (20%) found at Abompe and Kotokuom. Nkwanta-Kesse registered the highest percentage (50%) of farmers cultivating okra on 0.5 to 1.5 ha while the least percentage (20%) found at Mankranso, Kotokuom, Atwima Mim, Abaesua and Offinso. Respondents who cultivated okra on less than 0.5 ha ranged from 10 to 40% with Atwima Mim registering the highest percentage (40%) while the least percentage (10%) was recorded at Beposo and Nkwanta-Kesse. The highest percentage (40%) of farmers who cultivated okra on large scale (more than 3 ha) was recorded only at Kotokuom.

Majority of the farmers across the communities surveyed cultivated okra on small land area. This confirms the report by [15] that the Ghanaian agriculture is dominated by small holders with farm size of four hectares or smaller. Most lands in Ghana are either communally owned or belong to families, and this factor makes it quite difficult for people who want to undertake large scale crop production to acquire large hectares of land [15].

3.3 Constraints Associated with Okra Production in the Surveyed Communities

The problems encountered by the respondents in the surveyed communities are presented in (Table 2). Pest infestation, diseases, unfavorable weather conditions, unavailability of credit, high price of land, marketing problems, and poor extension services were the problems encountered by the respondents in the surveyed communities.

Most of the respondents (20 - 50%) ranked pests infestation as the major problem followed by diseases (20 - 30%). The highest percentage (50%) of respondents encountering pests infestations as a problem was recorded at Mfensi-Adankwame while the least percentage (20%) was found at Offinso. Mfensi-Adankwame, Beposo, Abaesua and Offinso recorded the highest percentage (30%) of respondents ranking diseases infection as a problem hindering the production of okra while the least percentage (20%) found at all the remaining six communities. Poor extension services was the least problem ranked by the respondents in the surveyed communities where Beposo, Abompe and Offinso registered 10% while none of the respondents at the remaining seven communities ranked extension services as a problem hindering okra production. Most of the respondents ranked pest infestations as the major problem of okra production followed by disease infections. This confirms the findings of [16] mentioning that farmers are faced with more than one constraint
in the crop production process. Effort must be made to address these constraints, especially pest infestation and disease infections considering the positive effect these would have on increased okra production in the study areas.

**Fig. 1. Number of years of respondents in okra production in the surveyed communities**

**Fig. 2. Cropping systems practiced by respondents in the surveyed communities**
Table 1. Marital status and level of education of respondents in the surveyed communities

<table>
<thead>
<tr>
<th>Community</th>
<th>Sex</th>
<th>Marital status</th>
<th>Level of education</th>
<th>%</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Married</td>
<td>Single</td>
<td>No formal education</td>
<td>Basic</td>
<td>Secondary</td>
<td>Tertiary</td>
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<td>20</td>
<td>100</td>
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<td></td>
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<td>40</td>
<td>0</td>
<td>0</td>
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<td></td>
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<td>50</td>
<td>10</td>
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<td></td>
</tr>
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<td>10</td>
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<td>40</td>
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<td>0</td>
<td></td>
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<td>100</td>
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<td></td>
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</tr>
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<td>40</td>
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<td>0</td>
<td>0</td>
<td></td>
</tr>
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<td>70</td>
<td>30</td>
<td>80</td>
<td>20</td>
<td></td>
<td>20</td>
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<tr>
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<td>91</td>
<td>9</td>
<td></td>
<td>43</td>
<td>54</td>
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</tr>
</tbody>
</table>

Table 2. Constraints associated with okra production in the surveyed communities

<table>
<thead>
<tr>
<th>Community</th>
<th>Pests</th>
<th>Diseases</th>
<th>unfavorable Weather</th>
<th>Unavailability of Credit</th>
<th>High price of Land</th>
<th>Marketing</th>
<th>Poor agricultural extension services</th>
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</thead>
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<td>0</td>
</tr>
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<td>Mfensi-Adankwame</td>
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<td>0</td>
<td>0</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>Beposo</td>
<td>30</td>
<td>30</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
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<td>0</td>
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<td>10</td>
</tr>
<tr>
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<td>0</td>
<td>10</td>
<td>0</td>
<td>20</td>
<td>0</td>
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<td>10</td>
<td>10</td>
<td>10</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
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<td>20</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>30</td>
<td>0</td>
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<td>0</td>
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<td>0</td>
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<td>20</td>
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<tr>
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<td>10</td>
<td>0</td>
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<td>9</td>
<td>6</td>
<td>9</td>
<td>15</td>
<td>3</td>
</tr>
</tbody>
</table>
3.4 Awareness of Okra Farmers on Seed-Borne Fungi Infection and Management in the Surveyed Communities

Fig. 4 represents the awareness of okra farmers on seed-borne fungi infection in the surveyed communities. Majority (60 – 90 %) of the respondents were not aware of seed-borne fungi infection of okra. Beposo and Atwima Mim recorded the highest percentage (90 %) of respondents who were not aware of seed-borne fungi infection of okra. The highest percentage of respondents (40 %) who were aware of seed-borne fungi infections of okra were recorded at Kotokuom and Offinso.

Fig. 3. Farm sizes (ha) of respondents in the surveyed communities

Fig. 4. Awareness of okra farmers on seed-borne fungi infection in the surveyed communities
Less percentage (10 – 50 %) of the respondents treated their seeds to manage seed-borne infection while majority (50 – 90 %) did not treat their seeds before storage (Fig. 5). The highest percentage of respondents (50 %) who treated their seeds before storage was found at Nkwanta-Kesse while the least (10%) was recorded at Beposo and Atwima Mim (Fig. 5). The highest percentage of respondents (90 %) who did not treat their seeds before storage was recorded at Beposo and Atwima Mim. The chemical seed treatment method reported by respondents included mixing the seeds with Funguran (Copper hydroxide). This study showed that, most okra farmers were not aware of seed-borne fungi infection and so did not manage the infection to improve their seed quality. The inadequate awareness among farmers about seed-borne fungi could be attributed to high level of illiteracy and poor extension services which may be a major hindrance for protecting vegetable crops from seed-borne fungi. This confirms the work of [17] who reported that a greater percentage of rice farmers in Ashanti region had no knowledge about rice seed-borne fungal diseases due to their high level of illiteracy.  

4. CONCLUSION

Majority of the farmers have low educational background coupled with low extension assistance impacted negatively on adoption of improved production practices. This study also showed that pest infestation and disease infection were greater hindrance to okra production in the study areas. Farmers’ unawareness of seed-borne fungi infection in okra is unfortunate and could be impacting negatively on the crop’s yield. It is therefore recommended that farmers be educated by extension officers on pest infestation, diseases infection and its management. Conscious efforts must be made by the extension officers to create awareness of the seed-borne infection in the study areas so that effective management options could be devised for adoption.

CONSENT

As per international standard or university standard, respondents’ written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES


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Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/69585