

**DISEASE MANAGEMENT IN CEREALS AND IMPLICATION FOR FOOD
SECURITY IN CENTRAL REGION OF MOZAMBIQUE**

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ABSTRACT

Although Mozambique has good soils and good climate for agriculture, the country population still face difficulties in how to fight against diseases affecting crops such as maize, rice and sorghum. The problem addressed in this article is about how diseases affect the reduction of production and hence food insecurity in the populations of Central Mozambique region. While the physical, economic access to food is a right of all people in all times and all over the world. For example, based on the concept of nutrition security, which involves the physical and economic access to balanced diet and drinking water for all people at all times emphasizing the importance of water in the world (Adrian, 2010). So, the mechanism of how to mitigate these diseases or pests that attack the following products elegant grasshopper, stem borer, microbes and birds should be created, even in toxic chemicals and microbes. (Jasse, 2013). For this purpose, it is necessary to measure the production of cereal crops, growing and harvesting so that mitigation mechanism can be created to diseases and pests through the use of pesticides and chemicals that are used properly. Due to the high price of the same resistance it can be used as a safer alternative and shape first time seeding with Pan 67, a long cycle hydrates with increased resistance to pests and in the second season a variety of short cycle 110-125 hydrates days with lower requirements.

Background to the Study

Plant diseases affect crop production in any country. At the present time, the threat of plant disease is particularly great in developing countries, where populations are growing fastest, poverty is endemic, the population depends on locally produced staples, and the infrastructure of extension often poorly resourced (Estranho, 2005). According to Estranho (2005), plant diseases are caused by a vast number of plant pathogens from several of a few hundred nucleotides to higher plants. Plant diseases cause crop losses ranging from small volumes to “catastrophes in which large areas planted to food crops are destroyed. Catastrophic plant disease exacerbates the current deficit of food supply in which at least 800 million people are inadequately fed (ibid). Estranho (2005) goes on explaining that “plant pathogens are difficult to control because their populations are variable in time, space, and

genotype. Most insidiously, they evolve, often overcoming the resistance that may have been the hard-won achievement of the plant breeder. In order to combat the losses they cause, it is necessary to define the problem and seek remedies. At the biological level, the requirements are for the speedy and accurate identification of the causal organism, accurate estimates of the severity of disease and its effect on yield, and identification of its virulence mechanisms”(ibid).

Mechanisms of plant disease control should be a priority to all stakeholders involved in agricultural production. Diseases affect all plants irrespective of where they are grown and the seed types or varieties. Thus, to increase productivity and curb against food insecurity concerted efforts must be put in place by government and research institutions to initiate effective policies and structures that are proactive to disease control. In this research farmers in the central region of Mozambique were asked about the mechanisms in place to combat plant disease and recommendations made accordingly.

The purpose for the study

The objective of this study was to identify the key pests or diseases that inhibit the growth of Cereals crop plants such as corn, rice and sorghum. And find solutions to mitigate this embarrassment, so that producers can be able to overproduce and achieve food security in the central region of Mozambique.

Research Questions

What types of diseases affect the production of cereals in Central Region of Mozambique?

What is the impact of diseases in cereal production and food security in the Center of Mozambique?

How to mitigate diseases in cereal production in the districts of Central Region of Mozambique?

Problem

There is availability of land for the practice of agriculture in Mozambique. There are about 36 million hectares (Hanlon, 2011), of which more than 10 million is arable land with good soils and climate. The central part of Mozambique has 5 million hectares (Sitoe, 2005) to be used for the practice of agriculture. From this, only 3.3 million hectares could be irrigated, but only 50,000 hectares is being irrigated (GPSCA, 2005). This irrigated land is equivalent to

0.13% of arable land (CEMO, 2011). Unfortunately even 98% of agriculture is very familiar with rudimentary production techniques and only the remaining 2% of commercial agriculture. In agriculture, few technologies are used to improve production, lack of use of services and agricultural practices. The proportional comparison between the number of holdings, the use of services and agricultural practices reveals that the use of fertilizers and irrigation increased only about 1% and the use of pesticides decreased about 2% (Jasse, 2013) and is increasingly more difficult to purchase. Basing of this, it is clear that the fighting of diseases or pests to crops of cereals such as maize, rice and sorghum is crucial problem for the failure of production and hence food insecurity.

RESEARCH METHODOLOGY

A paradigm is essentially in a worldview, a whole framework of beliefs, values and methods within which research takes place. According to (Cresswell, 1994. p. 15) “a qualitative study is defined as an inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting.” Qualitative research was used in this study because it comprises a set of different interpretive techniques aiming at describing and unfolding components of a complex system of meanings. It aims at translating and expressing the sense of the phenomena of the social world, thus reducing the distance between the indicator and the indicated, or between theory and data or between context and action.

According to (Hammersley, 1992) qualitative researchers share a set of preferences which are:

- A preference for naturally occurring data, that is, observation rather than experiment, unstructured versus structured interviews.

-“A preference for meanings rather than behaviour, that is, attempting to document the world from the point of view of the people studied.” (Hammersley, 1992, p. 165) a preference for inductive hypothesis is generating research rather than hypothesis testing.

Therefore, qualitative method was used for this research since the research was based on the way people experience social phenomena of cereal production in the real world in which they live, with particular focus on how they produce cereals. Thus, qualitative research enabled the researcher to come up with a “deeper” understanding of social phenomena than would be obtained from quantitative data. Though qualitative research downplays or avoids the use of quantitative instruments, numbers and other phenomenon that arise in research need to be

measured thus quantitative instruments had to be used in this research; for example, the number of farmers who produce wheat, or rice or maize and quantities and numerical values of significant data, that needed to be recorded quantitatively.

The method used in this study qualitatively resembles the interpretation of phenomena that are used every day, which have the same kind of data that the researcher employed in this research. (Godoy,1995) explains some key characteristics of a qualitative study. He asserts that qualitative research "considers the environment as a direct source of data, and the researcher, as a key instrument having a descriptive character; the process is the main focus of approach and not the result or a product; where data analysis is performed intuitively and inductively by the researcher"(p. 58). Thus, according to Godoy (1995, p.58) qualitative research does not attempt to enumerate and/or measure the events studied, nor employ instrumental statistical data analysis; it involves obtaining descriptive data about people, places and interactive processes by direct contact with the researcher who studies the situation, trying to understand the phenomena from the perspective of the subjects, that is, the situation of the participants in the study.

RESEARCH DESIGN

A research design is an architectural blueprint; a plan for assembling, organizing, and integrating information (data), and its results in a specific end product (research findings). The research design used in this research was the case study design. Gil (1994 cited by Revillion, 2000, p.7), says a case study is characterized by profound and exhaustive study of one or a few objects, in order to allow broad and detailed knowledge of the same. A case study allows for greater understanding of complex and systemic problems by studying the dynamics and interaction of multiple factors, from a few specific situations. However, in some case studies, generalisation of the observations may not be possible especially where the case may not represent the mean of a population. A case study examines a phenomenon in its natural environment by applying various methods of data generation in order to obtain information from one or more entities. In addition, the study's results depend heavily on the integrative power of the researcher, of his skill in site selection and methods of data generation, as well as the researcher's ability to make changes in the design of research in a timely manner.

According to Yin (1994, p. 2) "the case study proposes to investigate a contemporary phenomenon, where the boundaries between the phenomenon and its context are not clearly

perceived. Its utility is to assist in the development or improvement of theories. Empirical evidence should generate feedback to the unknown and enable analytical generalisation where possible.”

In this research therefore, individual farmers, and government officials were interviewed through the use of various instruments to draw out deep meanings of the current and future cereal production prospects in central region of Mozambique.

Robson (1993, p. 40) defines a case study as the development of detailed, intensive knowledge about a single “case”, or a small number of related “cases.” The case study approach also has considerable ability to generate answers to the questions, ‘Why?’ ‘What?’ and ‘How?’ (Robson, 1993, p. 44) and these were common questions in this research on why certain production methods were preferred, what was produced and how the cereals were produced.

Population

The population for this study included the peasants or small, medium and large agricultural farmers of central region of Mozambique, officials from the Ministry of Agriculture, cereal traders and elders living in the research areas. In addition, the population included economic agents, district officers from the government departments, agricultural associations, non-governmental organisations, transporters and the general public who are the consumers of the cereals. These constitute the key stakeholders in the production of cereals. In this region, different cereals such as maize, sorghum, millet and rice are produced and distributed through various categories of grain merchants, while the consumers who benefit from this process are mainly the general public. It is critical to note that there is always food crisis in those regions which are very close to the central region of Mozambique. For this research, data were generated from a heterogeneous population that represents the country's population that is practising agriculture in this region.

Sample and Sampling Procedure

The central region of Mozambique has four major provinces namely, Zambezia, Sofala, Manica and Tete. One district experiencing low cereal production in each province with agricultural potential was purposively selected. Thus, for Zambezia province Namacura district was selected, Gorongosa district was selected in Sofala province, Gondola District for Manica province and from Tete province Angonia district was selected. Cereal producers

and consumers were then selected using the simple random sampling method due to the fact that the participants reside in clustered homesteads and to save time, the researcher preferred this sampling method. The sample comprised groups of peasant farmers and agricultural associations to form designated focus groups for discussion. For the focus groups, guided unstructured interviews were carried out. This allowed the researcher to understand the profound reasons for the low production of cereals.

The population was divided into subpopulation (stratum). By stratification, the researcher grouped members of the population into homogeneous subgroups before sampling. The researcher then used a convenience sampling method within each stratum on the participants on the basis of their accessibility and convenience to the researcher. The main assumption for using convenience sampling method is that each stratum is homogeneous (Ross, 2006). The sample size of 32 was used for this research.

Sampling Procedure

Stratified random sampling was used for this research. For group discussion in each district, 6 people of the producer groups were selected. Within each group there were producers of sorghum, maize and rice and other cereals. The 7 participants were the principal farmers in each district who are the presidents of the associations. For each district, the director or the district director of agriculture was interviewed, totalising 8 participants per district. The following table 1 shows the sampling and stratification method used for this research.

Table 1: Sampling per Stratum

Target Participants	Strata	Number
Growers of sorghum	People with at least 1 ha and local leaders	1
Growers of maize	People with at least 1 ha and local leaders	1
Growers of rice	People with at least 1 ha and local leaders	1
Farmers of other cereal (specified)	People with at least 1 ha and local leaders	2
Mixed cereal growers	People with at least 1 ha and local leaders	2
Government Officials	Administrators in each district	1

Source: Author, 2013. Please note that this gave a sample of 8 persons per district and 32 persons total.

This was a representative sample since it covered as many people involved in cereal production as possible.

Being a qualitative study, this research included interactive interviews in the form of one-on-one interviews, focus group discussions, document analysis and observations. Primary data on demographic characteristics, for example agricultural crop type, crop quantity, quality of seed, uses of incomes, markets, agricultural technologies, agricultural policies and soils used for agriculture were collected.

Findings

These results indicated that farmers in the central region of Mozambique, specifically in Namacura, Angónia and Gorongosa district, were unanimous in stating that, in addition to lack of means of production for plant growth they face with pests such as “grasshopper, insects and microbes”. They said that these are the types of insects that create common diseases, but there are others that appear by chance, for example in Gondola and Gorongosa districts, beyond the aforementioned diseases also comes the dormouse and abundances of birds that reduces considerably the final product. So "lack of food persists from season by season, since we depend on food production to pay for school and buy clothes.

In the districts for which this article was based on, it has been reported that the pest is one of the very serious problems and contributes enough to the failure of the production of cereals and automatically has implications on the lives of farmers, because they cannot do anything without depending on the outcome of agriculture. In the case of Angónia sometimes farmers exchange fish or corn maize and beans. Since the Angónia district is quite visited by Malawians small-scale traders.

To combat these diseases, farmers still use very traditional mechanisms such as “Release soap sparkling water and traps for mice.”

The use of pesticides to combat the disease is almost nonexistent, because it is necessary to have money for the purchase and some cases, do not appear according to the farmers from Namacura, Gorongosa, Gondola and Angónia districts.

Discussion

During the research it was found that farmers are linked to problems of types of diseases such as locusts and microbes essentially during their agricultural activities of cereal crops such as corn, rice and sorghum. According to Jasse (2013) in any part of the world there are diseases

that attack plants. The important thing is after identifying, trying to combat the same to ensure food security. In Mozambique, the common pest is ‘elegant grasshopper’ nature, stem borer, insects and microbes.

Farmers cannot find mechanism to combat because the traditional system used by them is so rudimentary and it offers consistency and efficiency to mitigation. They even resort to sparking water soap and traps. But over the past 5 to 6 hours will have no effect because the smell of the soap wind or air flow which passes around, and the new rats that appear from different local side which are mounted the traps will great way fully counteract the disease control plans to the farmer. All this is due to lack of pesticides or the low purchasing power capacity of this product so valuable for mitigation. For Jasse, (2013) _ decreased pesticide use about 2% which is increasingly reduced use of the same product due to the high costs thereof.

Limitations

The limitations of this study consisted of access roads from one district to another. There are regions where there is flooding due to rain and these areas become almost impossible to drive to. The researcher generated data during the period of less rain. Informants were sometimes reluctant feeling uneasy with strangers. This problem of unwillingness by farmers to give the vital information was carefully taken care of as the researcher approached the farmers through their community leaders.

Conclusions

What types of diseases affect the production of cereals in Central Region of Mozambique?

In the central region of Mozambique, there is a predominance of diseases or elegant grasshopper as type of pests and also microbes and even the birds during the growth of plants and cereal crops and in the harvesting process, farmers face invasion of rice pests, corn and sorghum.

In this context, the farmer becomes involved in the harm situation as it will significantly reduce the production of maize, rice and sorghum, making it difficult to reach even the excesses that occur automatically in the food security of the community consisting of all enough nutritious food and considerably safe and appropriate period of at least one year.

The absence of food security creates many constraints such as the lack of food sovereignty that is a basic assumption on human rights. Everyone has the right to safe and healthy food in their communities. In the absence of food for people in society, it generates revolts socio-economic and political. It is concluded that to mitigate plant diseases of cereal crops in the central region of Mozambique, farmers hardly use pesticides and less chemicals, but the rudimentary system such as the soap of sparkling water, traps to retain the rats and dolls with characteristics of fixed people in place of cereal production in order to chase birds.

Recommendations

Through this article we recommend the local government to provide the fertilizers, chemicals and pesticides to the producers of cereal crops such as maize, rice and sorghum in the districts of Namacura,, Gorongosa, Gondola and Angónia with the purpose of combating plants diseases so that there is no implication on food security. As well as certified seed and agricultural technology are the bases for successful farmer while performing their activities in the same way. According to this study, the mechanisms of combating pests and plant diseases are conditional assumption for the cereal producer in the central region of Mozambique.

It is also recommended that farmers in Namacurra Gorongosa, Gondola and Angónia constitute effective and efficient associations to exchange experience of problems that appear during agricultural activities, as well as exchange experience between associations of different districts. Through these organizations, farmers can organise themselves to use more available and suitable services and agricultural practices (abandon traditional practices used by farmers in the central region of Mozambique) Such as, the purchase of pesticides and chemicals in a technically acceptable manner.

It is recommended that alternatively due to high prices of pesticides and resistance to chemicals an alternative may be employed in the first seeding time, with Pan 67, a long cycle hybrid with increased resistance to pests and second season a variety of short cycle with 110-125 days with lower hydrides needs.

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