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Assessment of Incidences and Severity of Cashew Leaf and Nut Blight Disease (CLNBD) in the Southern Areas of Tanzania

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Abstract: ***Cashew Leaf and Nut Blight Disease (CLNBD), which is caused by a fungus Cryptosporiopsisspp. is a serious devastating disease to cashew crop (Anacardiumoccidentale L.). The disease can cause significant losses in both yields and quality if not controlled. We conducted a survey to determine the incidences and severity of CLNBD in the cashew fields in thesouth eastern Tanzania covering six districts of Tandahimba, Masasi, Tunduru, Liwale, Nachingwea and Lindi. The results revealed that the disease was prevalent in all of the surveyed areas across the districts, although at varying levels of both incidence and severity. Cashew fields in Tandahimba were most affected by the disease followed by Tunduru, Masasi, Nachingwea and Lindi. However, Liwale appeared to be the least affected. These findings imply that immediate measuresare required in developing appropriate management strategies against the disease caused by Cryptosporiopsis pathogen.***

Keywords: Cashew, Cryptosporiopsisspp, disease, Tanzania

1. Introduction

Cashew (*Anacardiumoccidentale*L.) is the topmost tree crop in Tanzania in terms of foreign exchange earnings [1]. Therefore, improving its productivity could be paramount in increasing sources of income for both the government and Tanzanian community at large. Despite its importance as a cash crop in Tanzania, productivity of cashew has been fluctuating. This fluctuation is mainly attributed to biotic factors particularly fungal diseases [2]. Cashew Leaf and Nut Blight Disease which is caused by Cryptosporiopsis sp. continues to be a serious disease to cashew production. The disease has the potential of causing significant yield losses if not controlled [3]. Cashew producing farmers reported on the outbreak of the disease in some parts of southern Tanzania particularly in the cashew fields found in the Makonde plateau in August 2002 [4]. However, three months after the first reporting, similar symptoms of CLNBD were reported in other areas of Masasi and Nachingwea (see Figure 1 in the findings section). The disease was reported to be fast spreading causing severe crop damage and yield losses. However, the magnitude of the disease in terms of its spread and severity is yet to be quantified.

The symptoms based on field observations showed that, the disease attacks young tissues, particularly newly expanding leaves and developing nuts. The disease causesdark tan coloured angular lesions which are bordered by dark reddish brown marginson the leaf laminar[4]. Under severe infection, which often occurs during the early stages of infection, lesions enlarge and coalesce causing blighting and defoliation of the leaves. Older leaf lesions appear papery, silver or grey colour and the centre often falls out giving a shot-hole appearance. During reproductive phase of the cashew which is usually between July and September [5] the infection spreads to the young apples and developing nuts. The infected young nuts become blacken and most of them drop down prematurely, resulting in significant yield losses. The infected older nuts and apples become darkish and slightly sunken [6].

The cryptosporiopsis spp., which attacks the cashew crop, is favoured by wet weather condition and the presence of new flush leaves. The pathogen is most active during rainy season which is between November/December and April/May, which is the period for vegetative growth of cashew in the southern zone of Tanzania [5]. However, cashewnut yield losses are noticeable if the rains fall during the reproductive phase of cashew. In the Southern part of Tanzania, any rainfall between June and September is referred to as off-season rains and cashew growers consider these as 'bad rains' because they favour rapid growth and development of CLNBD.

A better understanding of incidences and severity of CLNBD can serve as a basis for not only estimating the negative impact on yields but also for developing appropriate control strategies of the disease. Thus, the main objective of the current survey was to explore information on the incidences and severity of CLNBD in the southern zone of Tanzania.

2. Materials and Methods

Description of the study areas

We conducted a survey in the southern zone of Tanzania during December, 2004 to assess incidences and severity of CLNBD. We covered six districts namely Tandahimba, Masasi, Tunduru, Liwale, Nachingwea and Lindi (Figure 1). The surveyed areas have a unimodal type of rainfall which normally starts in December/November through April/May [5]. The mean annual rainfall ranges from 820 to 1245 mm. The mean temperature is 26 ^{0}C in the coastal areas and 24 ^{0}C in the inland areas [7].

Survey design

The survey team comprised 8 personnel; 7 were from Naliendele Agricultural Research Institute in the Cashew

program and 1 was from the extension office in each district of Tandahimba, Tunduru, Masasi, Nachingwea, Lindi andLiwale. A total of 5 villages were selected where one village was randomly picked from each of the four geographical sides (North, South, East and West) within the district, and one village was picked from the centre of the district.

With the assistance of village leaders, six cashew farms were randomly selected in each of the selected villages making a total of 30 farms per district.

Determination of incidences and severity of CLNBD

At each selected farm, a total of 5 cashew trees were randomly selected across one diagonal part of the field. We assessed the presence of blight disease by visual observation using a $1m^2$ quadrat which was made up of wood. A quadrat was placed on two opposing sides ofthe cashew canopy. We counted all the shoots enclosed within the quadrat and the shoots that were showing symptoms of the disease. The percentage of the incidences were determined by the number of shoots showing symptoms of the disease divided by the total number of shoots enclosed within the quadrat x 100.

The disease severity levels were determined byselecting five shoots at a regular interval along one diagonal of a quadrat following disease scoring on five upper most leaves on each selected shoot, using the 0 to 6 disease severity score as described by [8]. Furthermore, farmers in each of the selected farms were interviewed on the likely causes of the disease.

Data from each farm were compiled in a frequency table of scores obtained from each class. Mean percentage disease infection per unit of observation was then estimated by multiplying each of the percentage range mid-point by the frequency of the observation units scored in the class relating to that range. The results obtained were summed-up and divided by the total number of observation units scored in the sample village. Data from each village were compiled and the means presented for each selected village in percentage levels. Data for the likely causes of the disease were coded and sorted accordingly. All data were analysed using SPSS program.

3. Results

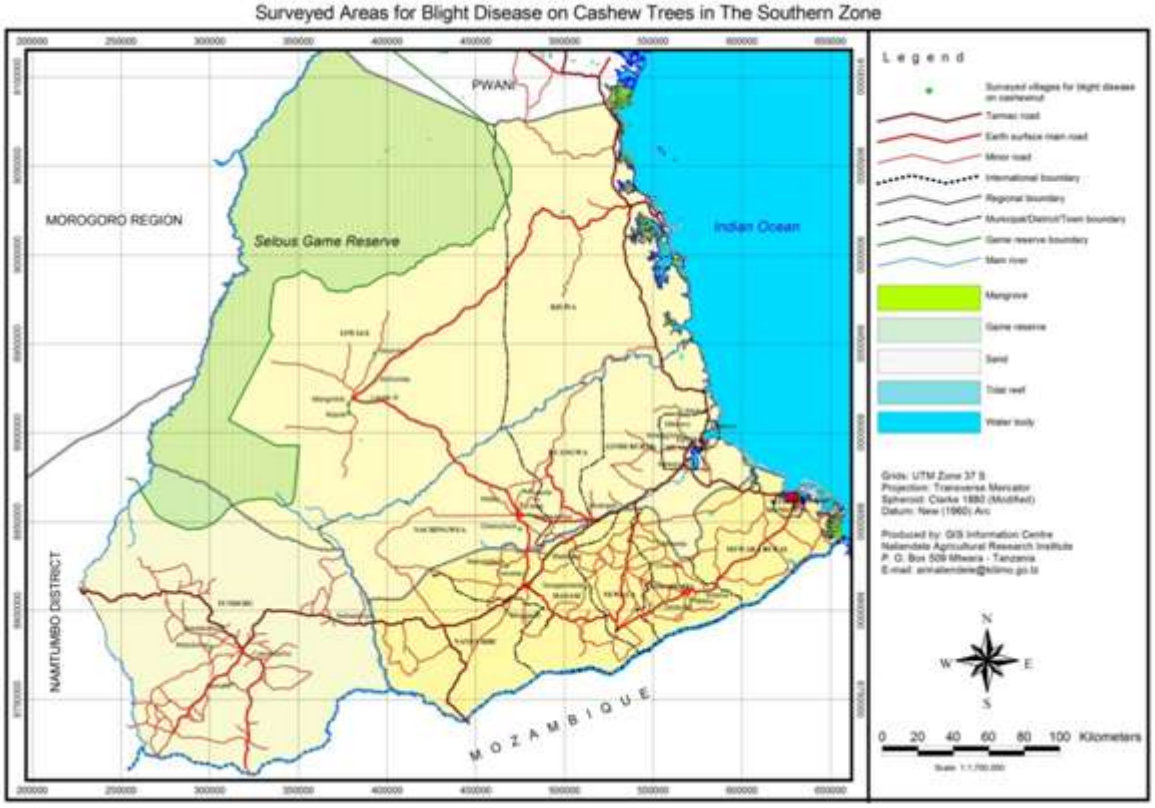


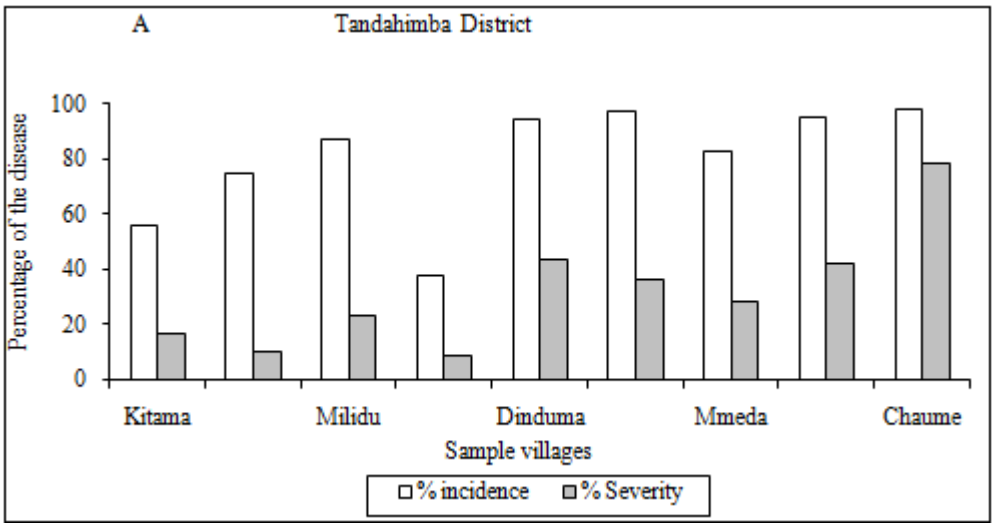
Figure 1: A map showing the surveyed areas for cashew leaf and nut blight disease in Tanzania

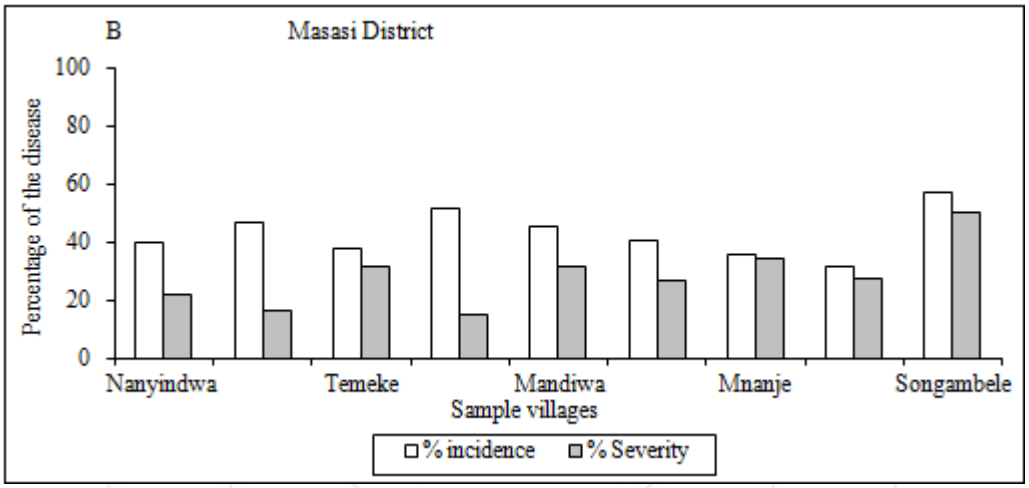
Incidence and severity of blight

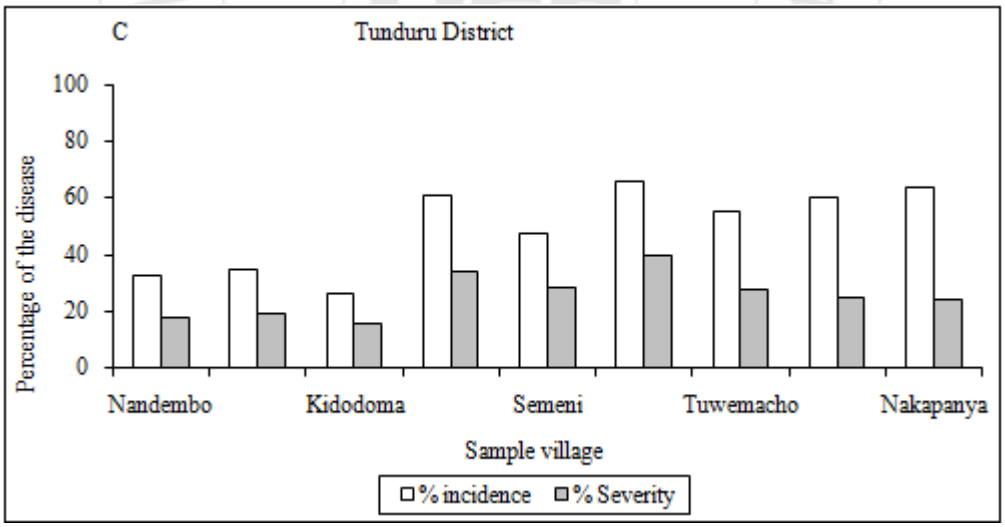
Figure 2A-F presents survey data, showing the levels of incidence and severity of blight in the six districts representing the Southern zone. The results show that the blight was observed across all sample districts, only varying in the levels of both incidence and severity. The overall mean data on the incidence and severity across districts (Figure 3) show that Tandahimba was the most affected by the disease followed by Tunduru, Masasi, Nachingwea and Lindi, while Liwalewas the least affected. Village wise, the blight appeared to be more severe at Chaume (TandahimbaDistrict) and Songambele in MasasiDistrict. The trend of the disease infection appeared to spread from the Southern towards the Northern areas of the zone.

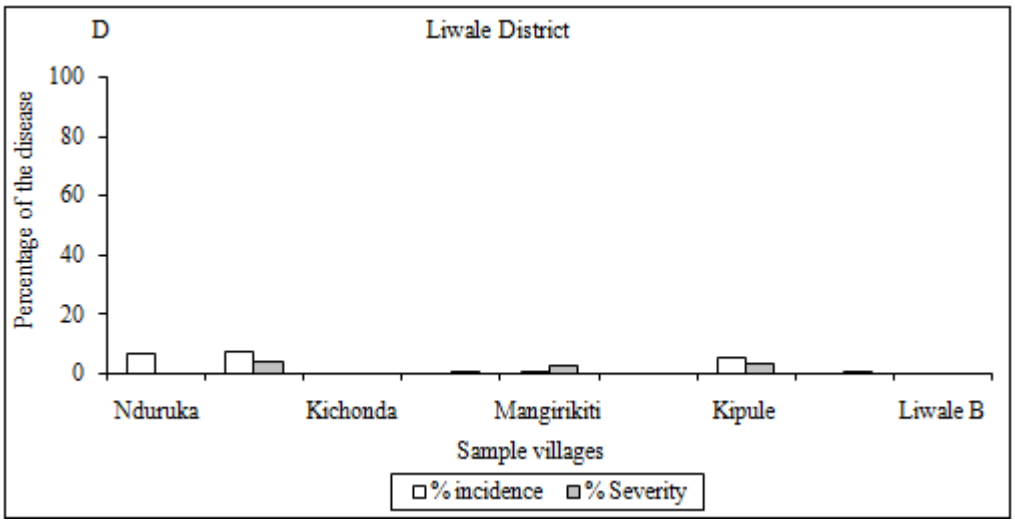
Likely causes of the disease

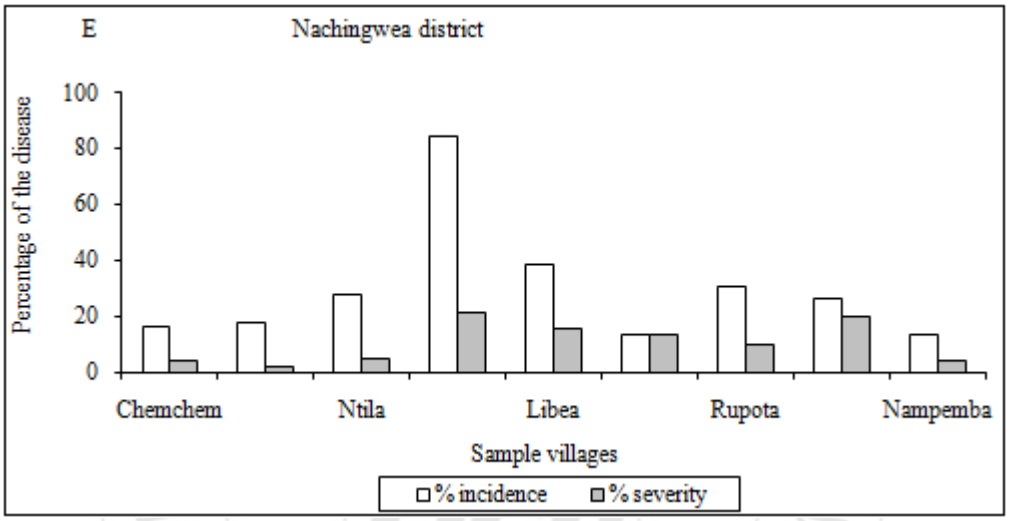
The survey results indicate that 90% (291) farmers do not know what could be the cause of this disorder. Only 4% (13) thought that pesticide usage could be the cause and about 6% (20) thought that drought could be the cause.











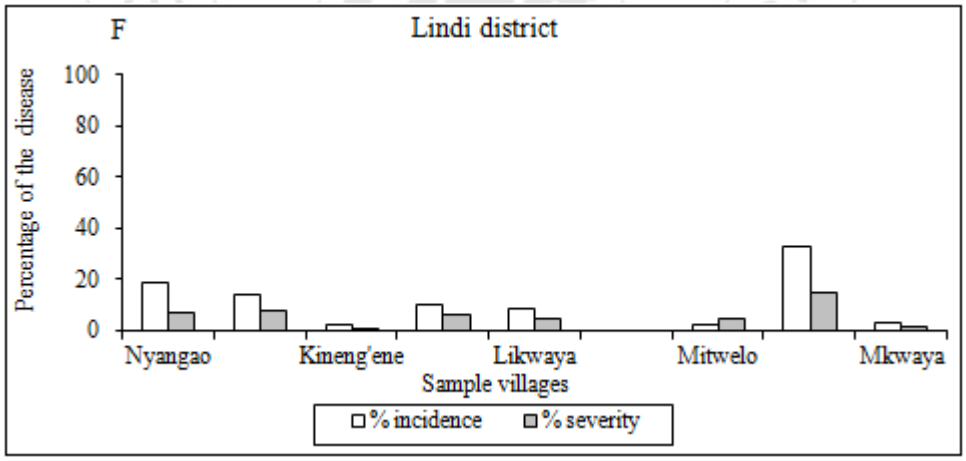


Figure 2 A-F: Percentage incidence and severity of the disease across all surveyed villages in the six selected districts in the southern zone

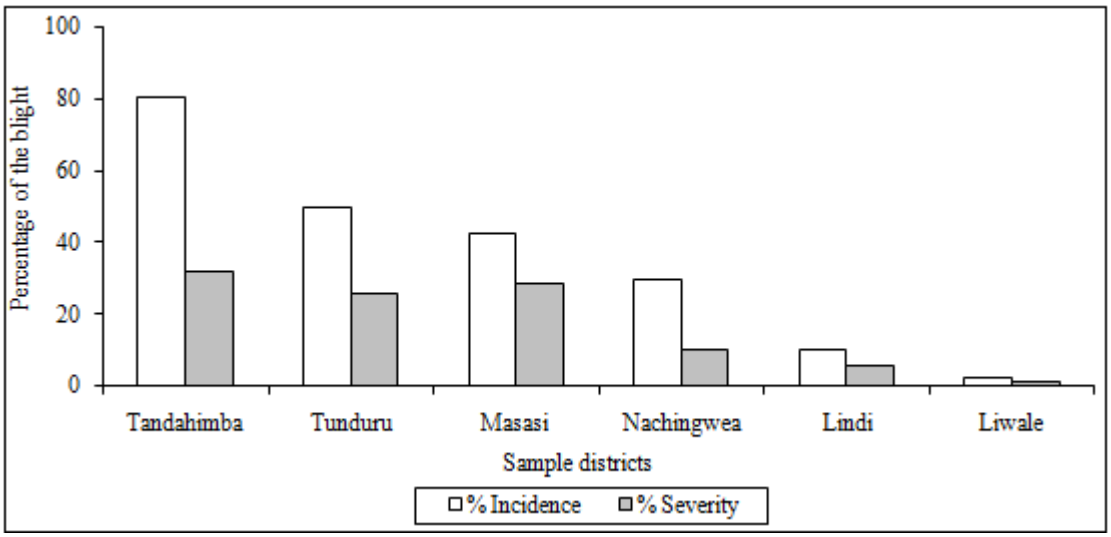


Figure 3: Mean percentage incidence and severity levels in the six selected districts in the Southern zone

4. Discussion

A survey on cashew leaf and nut blight disease was conducted for the first time in December 2004 in order to ascertain incidence and severity of the disease in some of the districts in the Southern zone of Tanzania. The results indicated that the disease was prevalent in most of the selected villages across the districts, although at varying levels in terms of both incidence and severity. Variations in both incidences and severity were observed in some sample villages across different farms and across districts. These variations are likely due to differences in the levels of flushing of the trees [9]. In some parts and for some trees, there was vigorous flushing of trees for vegetative growth,while in other parts there was less or even dormant flushing of trees for vegetative growth. The overall pictureseems to indicate that the disease was mainly observed on newly flushing leaves. New flush leaves are susceptible to diseases [9]. Symptoms were hardly seen on non-flushing trees. In this regard, the survey was well timed because by mid-December, there was already substantial amount of rainfall, which fell within weeks to coincide with vegetative flushes of most cashew trees during this particular time. In most cases, without new flushes or young nuts, one may wrongly conclude that the disease was absent at that particular area or tree. For that matter, care must be taken to see to it that all favourable conditions prevail before making strong inferences regarding the presence or absence of the disease in a particular area.

Cryptosporiopsis species are stem pathogens of woody hosts including fruit tress particularly in temperate countries [10]. *Cryptosporiopsis*species are known to cause symptoms on aerial plant parts, namely branches, trunks, and leaves [11].

Most farmers about 90% were not able to predict the likely causes of the malady in question. Only a few (6 and 4%) thought that the problem could be due to drought and pesticide usage respectively. This confusion may likely be due to blighting nature of the attack of this disease. The nature of infection in the form of blight is so devastating that farmers could not comprehend and thought it was another disease menace on ill-fated cashew trees which were already being attacked by more than a dozen diseases and insect pests. The belief that, this was an attack of another disease on cashew was a great disappointment to most cashew farming community.

5. Conclusion

Following the results of this survey, there are all indications that CLNBD is one of the biggest threats on cashew industry; thus, intensive and extensive efforts which include; awareness creation about the disease and appropriate management strategies must be made as a matter of urgency to address the disease before it spreads all over the country.

6. Acknowledgement

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