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Survey of the current distribution and status of bacterial blight and fungal diseases of cassava in Guinea

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Abstract

A survey was carried out of 86 cassava fields in the lowland savanna; humid forest, mid-altitude savanna, and lowland humid savanna agroecological zones of Guinea. Each field was assessed for the incidence and severity of cassava bacterial blight (CBB), cassava anthracnose disease (CAD), *Cercospora* leaf blight (CLB), and brown leaf spot (BLS). Samples of diseased leaves were collected and used to identify associated pathogens. CBB was present in all the four major ecozones. The disease was observed in 88.88% of the fields visited in the humid forest. For other ecozones, results were 70.5% (mid-altitude savanna zone), 73.07% (lowland humid savanna), and 77.7% (low-land savanna). Anthracnose disease was observed in the humid forest and lowland humid savanna zones, but not in either of the others. CAD was observed in 11.11% of the fields visited in the humid forest, and in 19.23% in the lowland humid savanna. The disease was not observed in either of the others. CLB and BLS were observed in all the zones; however, the severity of both diseases was generally low and they did not seem to pose a serious threat to cassava tuberous root yield.

Key words: cassava, bacterial blight, *anthracnose, cercospora*

Introduction

Cassava production is estimated by the Food and Agriculture Organization (FAO) at an annual global production of 202, 648, 218 t, Africa produces 108,109, 713 t. Out of these, Guinea produces 1, 350, 000 t (FAO Update to FAO, 2009). It is an essential part of the diet of more than half a billion people around the globe (FAO Update to FAO, 2009). The activities of various disease agents are some of the major constraints to achieving the full potential of cassava production in Africa. In cassava, losses in tuber yield from diseases can be as high as 90% (Wydra and Msikita, 1998). The need to protect cassava against diseases is, therefore, a crucial aspect in enhancing the production of the crop.

Materials and Methods

Farmers' fields were surveyed across the four agroecological zones of Guinea between 8 and 30 of August 2005. The survey followed the method described by Ogbe et al (2003). The number of cassava farms examined in each ecozone varied, depending on availability. A total of 86 farmers' fields were surveyed: lowland humid savanna (maritime Guinea) (26); humid forest (27); mid-altitude savanna (mid-Guinea) (17); lowland savanna (high Guinea) (18). In each farm, the assessment of disease severity was made on 30 randomly selected plants. Each plant was rated on a scale of 1–5 for cassava bacterial blight (CBB), cassava anthracnose disease (CAD), and *Cercospora* leaf blight (CLB); and on a scale of 1–4 for brown leaf spot (BLS) following the scoring system described by Wydra and Msikita (1998).

Leaf samples with CBB, BLS, CLB and CAD symptoms were collected for the isolation of pathogens. Isolation and identification was made at the Crop Protection laboratory of Foulaya – Kindia. The geographic position of the each farm was recorded using the Global positioning system (GPS).

Results

Geographical distribution of cassava bacterial and fungal diseases

CBB: CBB was present in all the four major ecozones. The disease was observed in 88.88% of the

fields visited in the humid forest. For other ecozones, results were 70.5% (mid altitude savanna zone), 73.07% (low-land humid savanna), and 77.7% (low-land savanna). When the results are considered across different ecological zones, higher severity scores of 3.05 were obtained for cassava farms in the low-land humid savanna; while farms in the other ecozones generally had severity scores from 2.76 to 2.94 (Fig. 6).

Locations in the mid-altitude and humid forest generally had low disease severity scores, while those in the humid lowland and lowland savanna had high scores. The highest mean severity score was recorded in Faranah (Marella) (3.76). Other areas with high severity scores were Kindia (Yombokoure) (3.07), Mamou (Sara) (3.58), Boffa (kafilya) (3.46), Forecariah town (3.46) and Gueckedou (Sabala) (3.46).

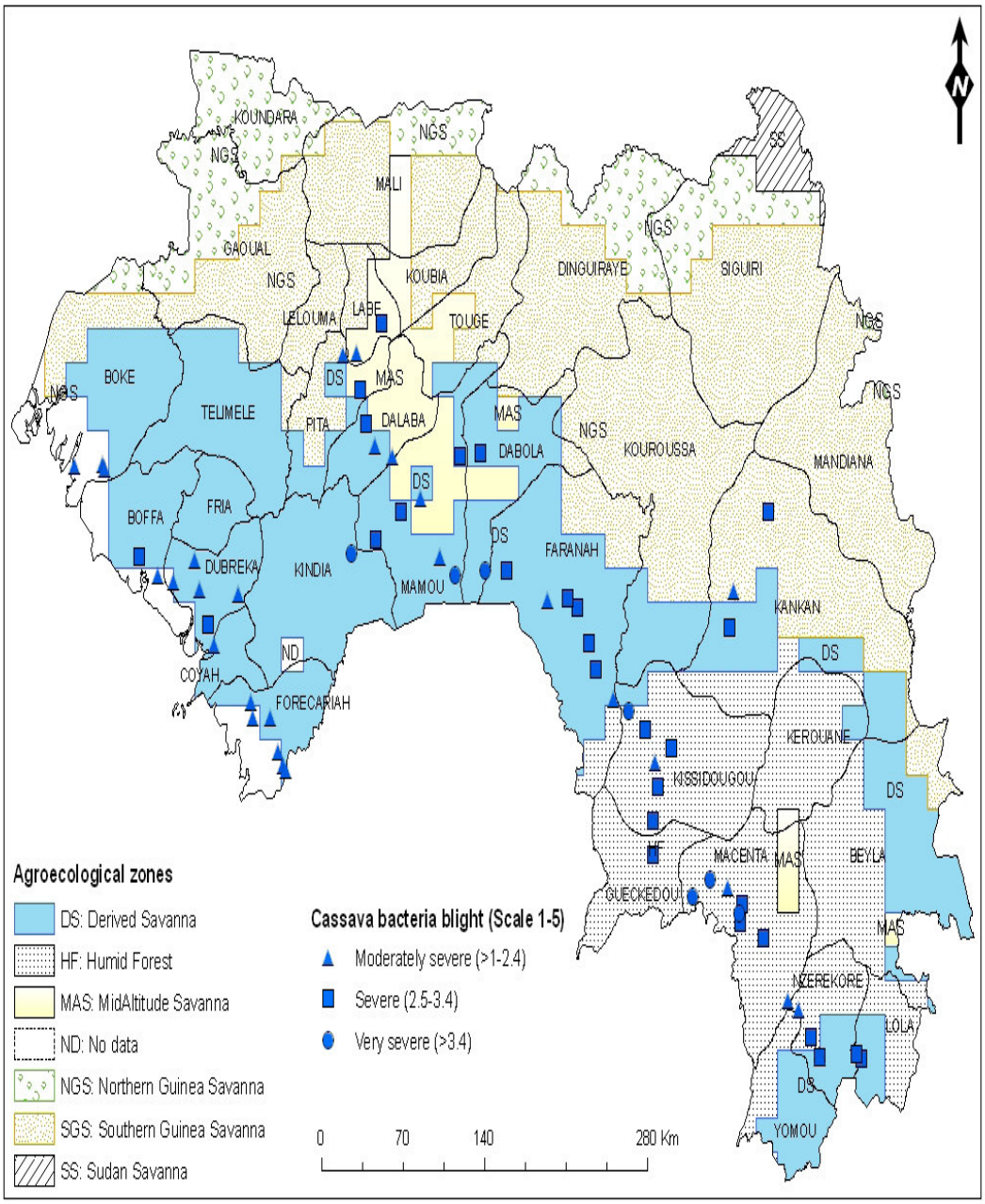

Figure 1: Map of Guinea showing the distribution of CBB across the various agro ecological zones.

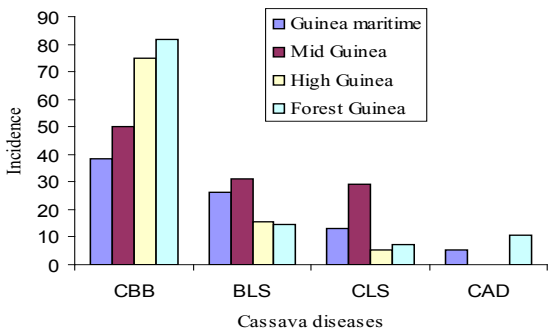

Fig 2. Incidence of cassava bacterial blight (CBB), cassava brown leaf spot (BLS), cerosporal leaf spot (CLS) and cassava anthracnose disease (CAD) in four agroecologies in Guinea.

CAD: Anthracnose disease was observed in the humid forest and derived savanna zones fig 3 , but not in any of the other ecozones (Fig. 3). CAD was observed in 11.11% of the fields visited in the humid forest, and in 19.23% in the lowland humid savanna. The disease was not observed in any of the other areas (Fig. 6). Higher mean severity scores were obtained in Lola (Lola camp) (3.0), Macenta (zebela) (3.0), (seredou) (2.6), and Dubreka (tanene) (2.66).

BLS and CLB: These two fungal foliar diseases were observed in all the ecozones. Their distribution trend varied across the ecozones (Fig. 5). CLB was observed in 7.4% of the fields visited in the humid forest, and in 29.4% in the mid-altitude savanna, in 42.3% in the low-land humid savanna, in the low-land savanna, only one field showed the disease.

Disease symptoms of BLS were recorded in 14.81% of the fields visited in the humid forest, 16.66% in the low-land savanna, 41.17% in the mid-altitude savanna zone, 65.38% in the low-land humid savanna. (Fig 6).

Mean severity scores of both diseases across the regions ranged from 1.0 – 3.8 for BLS and from 1.0 to 2.7 for CLS in the lowland humid savanna, and from 1.0 to 4 for both diseases in the mid-savanna regions, scores from 1.0 to 3.5 for BLS and from 1.0 to 2.1 for CLS were obtained for the regions in low-land savanna, in the humid forest areas, BLS varied from 1.0 to 4, while CLS scores varied from 1.0 to 3. The highest severity scores (4) for BLS was obtained in Mamou (Hafia) and Kissidougou (Boribana). The highest severity score of 4 for CLS were obtained at Mamou (foye) and Dalaba (sebhory) areas. (Fig 4)

Discussion

CBB: There is a high regional variation in CBB incidence between the savanna agroecological zones and the humid forest zone. We found the highest incidence of 88.8% in the forest regions and the lowest in the mid-altitude savanna. These results did not agree with the report of Wydra and Msikita (1998) who observed a higher incidence, up to 60%, in the savanna zone and a lower incidence of 24% for the rain forest. The very high rainfall during the survey

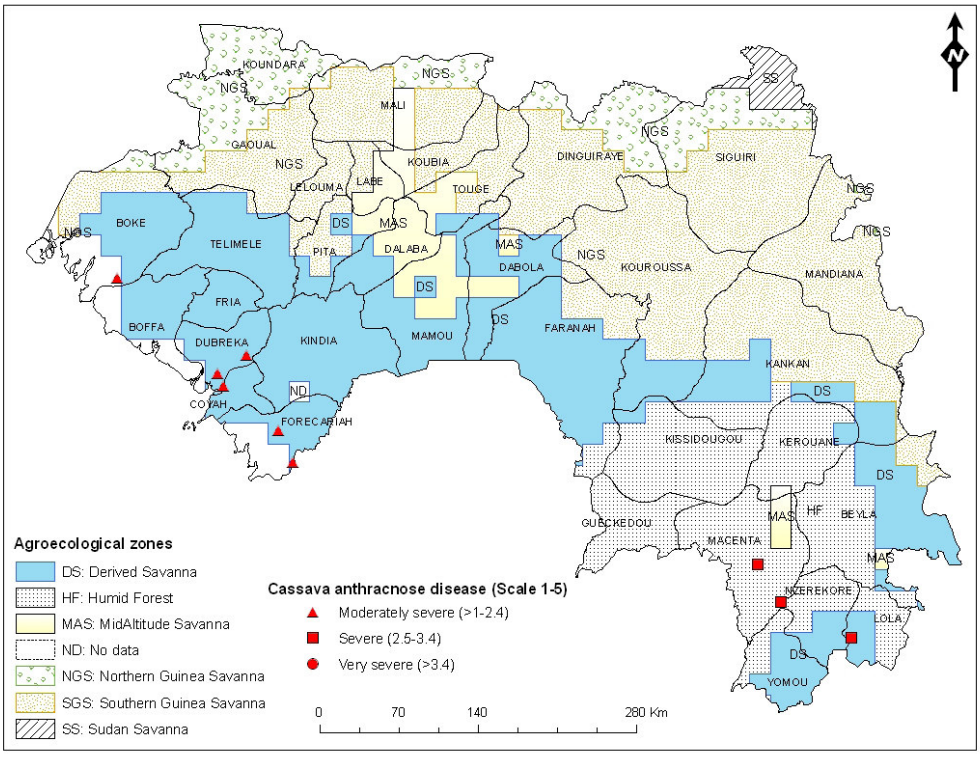

Figure 3: Guinea, showing the distribution of CAD across the various agroecological zones.

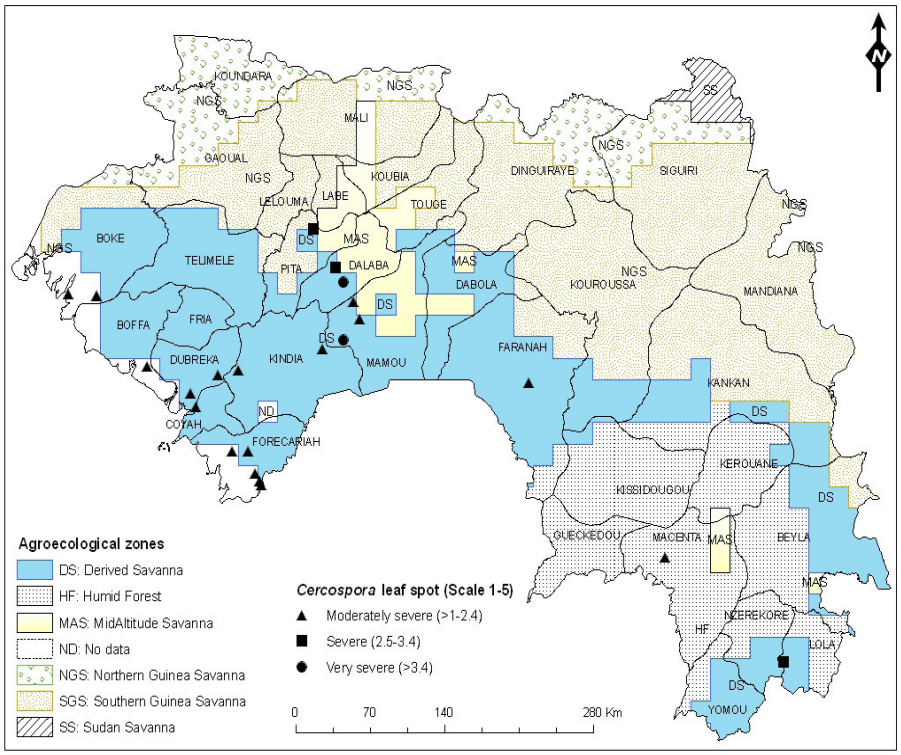

Figure 4: Map of Guinea, showing the distribution of CLS across the various agro ecological zones.

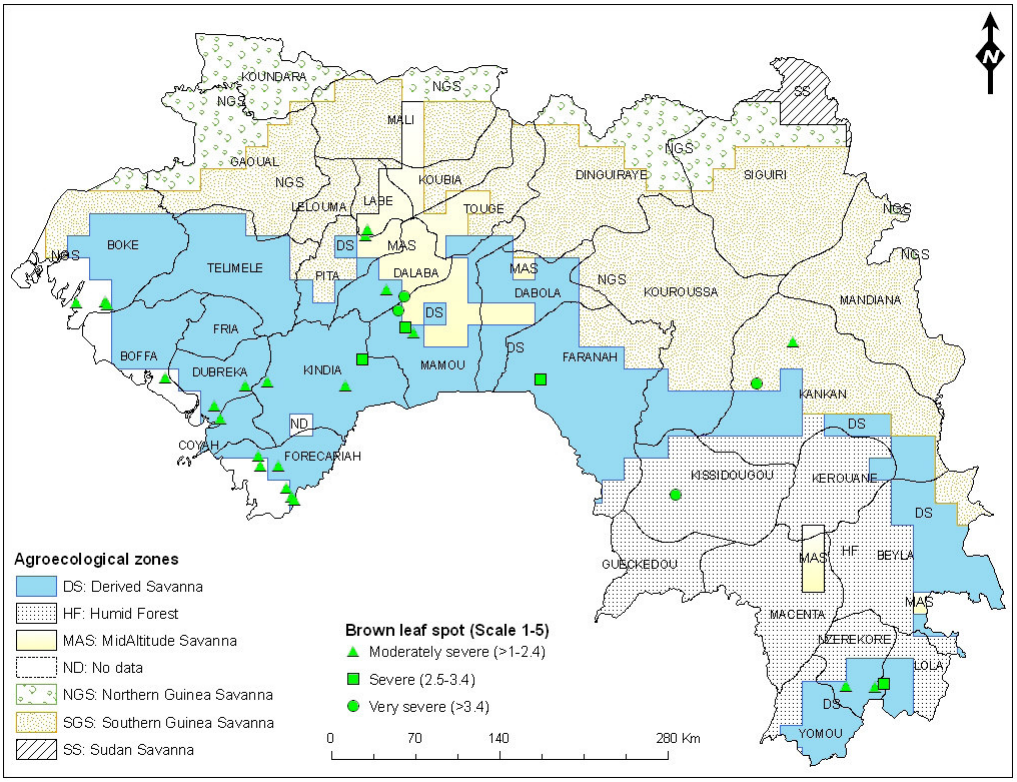

Figure 5: Map of Guinea, showing the distribution of BLS across the various agro ecological zones.

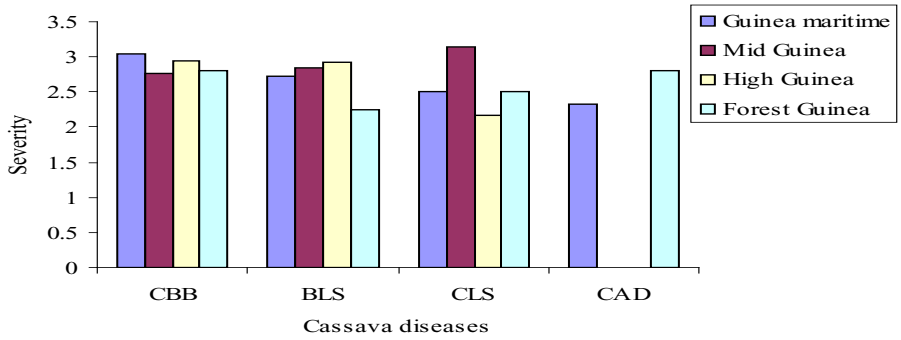

Fig 6. Severity of CBB, CAD, BLS and CLS in four agroecolgies in Guinea.

may be the explanation, as reported by (Hahn et al 1989) who reported that the severity and incidence are highly correlated to the amount of rainfall.

Anthracnose: The prevalence of CAD recorded in the humid forest and lowland humid savanna regions in any of the fields in the mid-altitude and lowland savanna zones was in line with the observations and findings in surveys conducted across West Africa showing that site and plant incidence of CAD were high across countries in the rain forest and considerable in the transition forest zones, less in the savanna zones, and unimportant in the mountain zone (Wydra and Msikita 1998).

CLB and BLS: These diseases were present in all the ecozones; however, their severity decreased rapidly towards the savanna zones. This result is in line with the observation of where high incidence of BLS was found on cassava plants infested with mealybugs, corresponding in Guinea to the case of mid-altitude savanna and lowland humid savanna.

Conclusion

This survey established the regional importance of CBB in the various ecozones of Guinea. CAD, BLS, and CLB seem to be less important compared with the severe infection of cassava mosaic begomovirus observed in cassava fields in all agroecologies. While the lowland humid savanna has the lowest CBB pressure, it is ideal for the establishment of a multiplication program ensuring CBB-free planting material.

The breeding program for cassava must, therefore, continue to emphasize multiple disease resistance in selection. A multiplication program is also needed for the supply of clean, improved planting materials to the farmers, as this remains the only viable option for the management of the diseases.

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