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Agronomic Performance of Varieties of Cassava in the Western Region of Ghana on Root Rot Disease

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Abstract
The purpose of the study is to assess the agronomic performance of ten varieties of cassava in the Western Region on root rot disease. The randomized complete block design (RCBD) was used. The study was carried out in the Western Region of Ghana. The Regional and the District Directors of Agriculture in the Western Region were consulted to select the districts in which the root rot disease of cassava was endemic to serve as focal points for the project. With the assistance of the Crops Services Officers, one location was selected in each district; Anwonakrom in the Mporhor Wassa East district, Agona Junction in the Ahanta West district and Bonyire in the Jomoro district. It was found out that all varieties used except Tek Bankye were probably susceptible to the root rot disease even though the infection levels varied. The infections were influenced by location; the rot disease was more endemic at Anwonakrom than at Bonyire and Agona Junction. Unmarketable roots were generally produced by all the varieties.The establishment of all varieties was good except Doku Duade and Esam Bankye which performed poorly. It was recommended that farmers in the Western region should be given the released improved varieties which are high yielding and resistant to activities of pathogens which cause root rot in cassava, for example, Tek Bankye.
Keywords: Agronomic performance, Root and Tuber Improvement Programme, Root rot disease

Introduction

Cassava (*Manihot esculenta,* Crantz), one of the major tropical root crops, is widely grown and mostly used as subsistence staple in tropical and subtropical Africa. The increasing world population calls for high levels of food production to meet the high demand but unfortunately food production has not kept pace with the rising population growth in developing countries especially Africa (IITA, 1990). The increasing world population requires that food production be increased at rates sufficient enough to meet the nutritional requirement of both man and animals.

Meanwhile most developing countries, including Ghana, rely heavily on Agriculture for survival and face the problem of producing adequate food to satisfy the ever increasing human population. FAO (2002) reported that cassava is the second most important staple in terms of per capita food energy consumed.

Horton and Fano (1985) estimated that 37% of the energy in the diet of Africans comes from cassava, owing to its efficient production of energy, all year round availability, tolerance to extreme stress conditions and suitability for present farming and food systems in Africa.

Cock (1989), stated that the crop is widely adaptable to a wide range of ecological conditions such as soils too depleted of nutrients, prolonged periods of drought and pests attack. As a result, it is cultivated in all the regions of Ghana (Doku, 1969). Global cassava production reached over 160 million tons in 1999, and it was projected that production would rise to nearly 210 million tons by 2005 (IFAD and FAO, 2000).

According to FAO (2002), cassava production in the sub–Saharan Africa has grown sharply between 1980 and 2001. Total output rose from 48 to almost 94 million tons, while the area under cultivation of the crop rose from 7 to 10 million hectares. In the humid and sub–humid areas of tropical Africa, cassava is either a primary staple or a secondary co–staple. About 80% of Africa's cassava production, equivalent to 42 million tons in 1972, was produced in West Africa.

According to Okigbo (1998), reasons for the rapid spread of cassava in West Africa are:

1. It can tolerate poor soils on which most other crops fail.
2. It resists drought, except at planting time, and it resists locust damage, making it a good famine crop.
3. Cassava is very easily propagated by stem cuttings that are not used for food, unlike the case with yams,
4. Cassava is a relatively high yielder and an excellent source of calories. It can produce more carbohydrate per unit area than is provided by other staples.
5. Cassava is inexpensive to produce and requires very little weeding when planted in optimal population, has no critical planting date provided there is enough moisture at planting and its roots can be left stored in the ground

and harvested when required.

In Ghana cassava has been grown since 1750, (Carter *et al*, 1995). The area planted to it ranged from 323,000 to 415,000 hectares annually between 1987 and 1990. The bulk of the production comes from the southern part of the country, with Ashanti, Volta, and Brong- Ahafo being the major producers. According to MOFA (2001), the estimated levels per capita consumption of cassava for the year 2000 was 151.4 as against 42.5 for maize and 42.3 for yam.

The uses to which cassava can be put seem almost unlimited. Purseglove (1988) stated that agronomically, the cassava plant is used as a nursery-crop for cocoa in Trinidad as is also practiced in the cocoa growing areas in Ghana. Kay (1987) reported that cassava starch is used to manufacture drugs and other chemicals. Industrially, starch and products derived from cassava have many uses including confectionery, custard powder, pudding, cosmetics, and adhesive, in sizing textile, laundering, and printing of paper and bakery products. (Jones, 1959).

Traditionally, cassava roots are processed by various methods into different products and used in diverse ways according to local custom and preference to provide carbohydrate in the diet. Examples of these are gari, fufu, tapioca, starch, abolu, atieke etc. The leaves are used as potherb and the tender parts and peelings are fed fresh or dried to animals. Sometimes, the dried peels are used as fuel for the smoking of fish in the fishing villages. It has also been demonstrated in Cameroon that poultry farmers could lower their production costs by incorporating cassava into their chicken feed (FAO, 2005).

Cassava is a crop that has been referred to as "Poverty and Hunger Fighter" by the NEPAD Pan-African Cassava Initiative as a result of the numerous potentials in the form of food for human beings, feeding about half a billion people in the world and about 200 million people in Africa. It is also a major source of food for feeding domestic animals, as well as serving as a binding agent in pharmaceutical and paper industries, etc. Cassava flour is another important product of this root crop. Cassava flour can practically and technically replace wheat flour in processing meat, sweets, cookies, meat pies, iced creams, bread, etc. In Brazil, every wheat flour product contains at least five percent (5%) cassava flour (Bokanga, 1995). It is also reported that a 15 percent substitution of cassava flour for wheat flour saved Nigeria close to US$ 15 million a year in foreign exchange (FAO, 2005). Thus cassava plays a major role in poverty alleviation (FAO, 2005).

The average yield of cassava per hectare in Ghana for example was 11.8 metric tonnes in the year 2000 but the achievable average yield was estimated at 28.0 metric tonnes per hectare (MOFA, 2001).

The pests and diseases of cassava in Ghana are known to limit production. The major pests include variegated grasshopper – *Zonocerus variegatus* (L), the cassava mealybug – *Phenococcus manihotis* (Matferr), white fly – *Bemisia tabasi* (Genn), the cassava green mite - *Mononychellus tanajoa* (Bon dar), and rodents like grasscutters.

The major diseases include root rot diseases caused by fungal pathogens such as *Sclerotium*, African cassava mosaic disease – a viral disease and bacterial blight – *Xanthomonas campestris p.v. manihotis* (Arthaud-Berthet) star (Korang-Amoako, 2002). Disease causes serious losses in cassava (Anon, 1978). Opoku-Asiama *et al* (1998) carried out a research on fungi associated with pre-harvest root rot disease caused by the fungus *Laetiporus* (Polyporus) s*ulphureus* at Anomabo to confirm root losses due to the root rot disease. The incidence of the disease has been reported at Bawjiase in the Awutu Efutu Senya District, Akim-Oda District in the Eastern Region, and further more in some parts of Volta Regions of Ghana (pers communication). The observed scattered spread of the root rot disease in major cassava growing areas including the Western Region and the reported high losses of between 25-100% caused by the root rot disease of cassava (Obeng- Sarkodie, 2002) are clear indications that the root rot disease poses a threat to the cassava industry in Ghana.

Cassava root is an important staple food crop in the Western Region of Ghana where it is mainly used in the preparation of fufu and or processed into atieke. Due to the heavy rainfall which normally occurs throughout the twelve calendar months of the year, and the high relative humidity prevalent in the region, processing of the cassava root through sun- drying after it has been chopped into chips for long term storage is not feasible. An important attribute of cassava is that after maturity, harvesting can be delayed for up to 12 months or even more without any adverse effect on the mature root. Cassava roots can be stored in the soil for longer periods; this is true in particular for the bitter varieties. The common practice in the Western Region is therefore to leave the root in the soil after maturity, and to harvest it in piece-meal when there is the need for it. This practice is constrained by high incidence of root rot disease in some parts of the region, causing direct loss in root weight in the susceptible varieties which result in very high yield losses and therefore pose a threat to food security in the region and the whole country. The crop is harvested early, resulting in loss of yield because early harvesting reduces food security as the root can not be stored in the field. It is therefore essential to know the spread of the root rot disease in some areas in the Western Region for the development of an effective agronomic practice for its control. This suggests that variety screening for resistance to root rot is a promising approach to solving the disease problem. Since cassava is a subsistence crop, only cultural and sanitary measures plus resistant varieties are feasible as control strategies for farmers. These measures need to be combined in order to be effective.

The newly introduced and improved varieties of cassava plant which were released under the Root and

Tuber Improvement Programme (RTIP) in Ghana were not adequately tested in the Western Region for yield and other agronomic traits that will suit the climatic and edaphic conditions of the region.

Statement of the Problem

Pre-harvest cassava root rot has been identified to be one of the major constraints of cassava production in the world especially in Africa of which Ghana is no exception. This has been a major problem confronting both subsistence cassava production in the country and the government's Presidential Special Initiative on cassava (PSI on cassava) production in Ghana (Quashigah, 2003). This has necessitated the need to have a thorough study of the root rot situation in some endemic parts of the region and the search for a remedy to the problem.

Purpose of the Study

The purpose of the study is to assess the agronomic performance of ten varieties of cassava in the Western Region on root rot disease.

Research Questions

1. To assess the agronomic performance of ten varieties of cassava in the Western Region on root rot disease.

Methodology

The randomized complete block design (RCBD) was used. The study was carried out in the Western Region of Ghana. The Regional and the District Directors of Agriculture in the Western Region were consulted to select the districts in which the root rot disease of cassava was endemic to serve as focal points for the project.

Jomoro, Ahanta West and Mporhor Wassa East districts were selected for the investigations. With the assistance of the Crops Services Officers, one location was selected in each district; Anwonakrom in the Mporhor Wassa East district, Agona Junction in the Ahanta West district and Bonyire in the Jomoro district.

The experiment involved the screening of ten recently released improved varieties of cassava for resistance to root rot and other agronomic traits. The varieties of cassava used were Capevars Bankye, Adehye Bankye and Bankye Botan from University of Cape Coast; Doku Duade, Agbelifia, Bankye Hemaa and Esam Bankye from the Crops Research Institute (CRI) and Nkabom, IFAD and Tek Bankye from Kwame Nkrumah University of Science and Technology (KNUST).

The experiment was carried out at Anwonakrom in the Mporhor Wassa East District and Bonyire in the Jomoro District but not in all the three districts due to logistical constraints. The experiment dealt with the screening of ten varieties of cassava for resistance to cassava root rot disease, for starch yield and for other agronomic traits. The main objective, however, was to evaluate the recently released improved varieties of cassava for tolerance or resistance to root rot disease and other agronomic traits.

History of Experimental sites

The site at Agona junction had been previously cultivated with oil palm. The palm trees were however uprooted the year before the onset of the project. The site at Anwonakrom had the same history as in Experiment one.

Data Collection

On the ninth and tenth month, thus, before the actual harvesting time, a few plants were sampled from the field on each plot to check for any incidence of root rot. The actual harvesting was done when the plants were twelve months old at Anwonakrom and on the thirteenth month at Agona Junction.

A field day was organized for ten local farmers and four Ministry of food and agriculture (MoFA) workers to help assess the yield, resistance to root rot and other agronomic factors, and also to assess the effect of sanitization of planting materials and the application of soil amendments on the agronomic traits of Adehye Bankye.

Ten plants were harvested per plot at Anwonakrom and ten plants per plot at Agona Junction for the determination of the various parameters. The farmers at Agona Junction had the chance of cooking some of the cassava roots to check on the effect of the treatments on the taste of roots.

Results

The percentage establishment for ten cassava varieties at Anwonakrom and Bonyire

The percentage establishment of the various varieties is indicated in Table 1. The location means were similar and no significant differences existed between them; the values ranged between 100% (IFAD) and 44% (Doku Duade) and the location mean was 79% at Bonyire. At Anwonakrom IFAD recorded 100% establishment and Esam Bankye 35%; the location mean was 74%.

Five varieties (IFAD, Nkabom, Bankye Botan, Capevars Bankye and Adehye Bankye) performed very well at Anwonakrom and recorded above 95% establishment. Bankye Hemaa, Agbelifia, Esam Bankye, and Doku

Duade recorded values below the location mean (Table 1).

Table 1: Percentage establishment

VARIETY	LOCATION		MEAN
	ANWONAKROM	BONYIRE	
IFAD	100	100	100a
Nkabom	97	98	98a
Bankye Botan	96	91	94ab
Capevars Bankye	97	79	88 abc
Adehye Bankye	96	72	84 abc
Tek Bankye	77	74	76 cd
Bankye Hemaa	63	82	72 cd
Agbelifia	47	77	62 de
Esam Bankye	35	72	54 ef
Doku Duade	37	44	41 f
Mean	74ns	79ns	77

SE = 4.76 CV = 12.42% ns: not significant

Means bearing identical letters are not significantly different at p = 0.05

Furthermore, only four of the varieties (IFAD, Nkabom, Bankye Botan and Bankye Hemaa) tested at Bonyire recorded percentage establishment values above the location mean of 79% (Table 1). The following, however, performed below the mean location value; Agbelifia, Tek Bankye, Adehye Bankye, Esam Bankye and Doku Duade.

Nkabom, Bankye Botan Capevars Bankye and Tek Bankye performed better at Anwonakrom than at Bonyire.

The percentage establishment for the various varieties ranged between 100% for IFAD to 41% for Doku Duade. The value for IFAD was significantly higher than those of Tek Bankye, Bankye Botan, Bankye Hemaa, Agbelifia, Esam Bankye and Doku Duade but not different from the rest which performed below the varietal mean of 77% (Table 1).

The percentage of wholesome roots for ten cassava varieties at Anwonakrom and Bonyire

It could be seen from Table 2 that the percentage values of wholesome roots recorded at both locations were not significantly different from each other. The values ranged between 87.1% and 70.8% with a location mean of 80.7% at Anwonakrom, while at Bonyire it ranged between 94.3% and 68.8% with a location mean of 78.0%.

Five varieties (Tek Bankye, Doku Duade, Esam Bankye, Bankye Botan and Adehye Bankye) performed better at Anwonakrom and recorded values above the location mean; the rest had values below the location mean. Similar observations were made at Bonyire where five varieties recorded values above the location mean; these were Tek Bankye, Doku Duade, Esam Bankye, Agbelifia and Capevars Bankye.

The bulk of the roots harvested for each variety were wholesome. The percentage of wholesome roots ranged between 91.0% for Tek Bankye and 69.8% for IFAD. The percentage of wholesome roots for IFAD was significantly lower than those of Tek Bankye, Doku Duade and Esam Bankye, but was not different from the rest.

Table 2: Percentage of wholesome roots

VARIETY	LOCATION		MEAN
	ANWONAKROM	BONYIRE	
Tek Bankye	87.1	94.3	91.0 a
Doku Duade	86.9	88.0	87.5 a
Esam Bankye	87.3	82.0	84.7 a
Agbelifia	79.4	84.9	82.2 ab
Bankye Botan	84.1	74.0	79.1 ab
Adehye Bankye	83.3	71.1	77.2 ab
Capevars Bankye Nkabom	75.0	78.5	76.8 ab
Bankye Hemaa	73.5	75.8	74.7 ab
IFAD	77.1	63.0	70.1 ab
	70.8	68.8	69.8 b
Mean	80.7ns	78.0ns	79.3

SE = 0.59 CV = 26.13% ns: not significant

Means bearing identical letters are not significantly different at p = 0.05

Tek Bankye, Doku Duade, Esam Bankye and Agbelifia recorded mean values that were higher than the varietal mean of 79.3%; all others recorded values below this mean.

The percentage of tiny roots for ten cassava varieties at Anwonakrom and Bonyire

The percentage of tiny roots ranged between 22.7% for Bankye Botan and 7.2% for Esam Bankye at Anwonakrom where the location mean recorded was 14.8%. The percentage tiny roots recorded at Bonyire ranged between 37.0% for Bankye Hemaa and 5.7% for Tek Bankye; the location mean was 20.5% as indicated in Table 3.

Table 3: Percentage of tiny roots

VARIETY	LOCATION		MEAN
	ANWONAKROM	BONYIRE	
Bankye Hemaa	22.0	37.0	29.5 a
IFAD	19.4	29.9	24.7 ab
Nkabom	22.7	23.2	23.0 ab
Adehye Bankye	15.2	28.6	21.9 ab
Capevars Bankye	17.7	21.5	19.6 ab
Bankye Botan	9.0	26.1	17.6 ab
Esam Bankye	7.2	18.0	12.6 ab
Agbelifia	12.7	7.4	10.0 b
Tek Bankye	12.9	5.7	9.3 b
Doku Duade	9.0	7.6	8.3 b
Mean	14.8 ns	20.5 ns	

SE = 0.62 CV = 30.00% ns : not significant

Means bearing identical letters are not significantly different p = 0.05

The following varieties performed above the mean value for location at Anwonakrom: Tek Bankye, Agbelifia, Bankye Botan, Doku Duade and Esam Bankye. Similarly, four varieties at Bonyire recorded values above the location mean; these were Esam Bankye, Doku Duade, Agbelifia and Tek Bankye.

There were variations in the values recorded in the two locations. For example, Bankye Hemaa 22.0% at Anwonakrom and 37.0% at Bonyire; Bankye Botan 9.0% at Anwonakrom and 26.1% at Bonyire. Similar performances in both locations were recorded by Nkabom and Doku Duade (Table 3).

With regards to the location effect, no significant differences were observed between the two locations. The varietal means as far as tiny roots produced by the ten varieties were concerned ranged between 29.5% for Bankye Hemaa and 8.3% for Doku Duade. The percentage tiny roots for Bankye Hemaa was significantly higher than those of Agbelifia, Tek Bankye and Doku Duade but was not different from the rest.

The percentages of root rot incidence recorded for ten cassava varieties at Anwonakrom and Bonyire

The cassava root rot disease infected more roots at Anwonakrom (3.9%) than at Bonyire (1.3%) as seen in table 4. With regards to location effect, highly significant differences were observed between the two locations. The percentage of root rot ranged between 8.2% for IFAD and 0.0% for Tek Bankye at Anwonakrom. Doku Duade and Tek Bankye were not infected at all at Anwonakrom. At Bonyire, the range was between 4.9% for Agbelifia and 0.0% for the following varieties: Bankye Botan, Capevars Bankye, Esam Bankye, Adehye Bankye, Bankye Hemaa and Tek Bankye. Only two varieties, Agbelifia and Doku Duade, recorded percentage values higher than the location mean.

Table 4: Percentage root rot

VARIETY	LOCATION		MEAN
	ANWONAKROM	BONYIRE	
Agbelifia	7.5	4.9	6.2 a
IFAD	8.2	1.2	4.7 ab
Bankye Botan	6.9	0.0	3.5 abc
Capevars Bankye	6.3	0.0	3.2 abc
Nkabom	3.8	1.0	2.4 abc
Esam Bankye	4.3	0.0	2.2 abc
Doku Duade	0.0	3.2	1.6 abc
Adehye Bankye	1.4	0.0	0.7 bc
Bankye Hemaa	0.7	0.0	0.4 bc
Tek Bankye	0.0	0.0	0.0 c
Mean	3.9 *	1.3 *	

SE = 0.42 CV = 55.10% * = Significant at 5%

Means bearing identical letters are not significantly different at 5%

Even though the percentage root rot value recorded by Doku Duade was 0.0% at Anwonakrom, it recorded the second highest value of 3.2% at Bonyire. All the other eight varieties recorded higher mean values at Anwonakrom than at Bonyire, for example. Bankye Botan had 6.9% at Anwonakrom but 0.0% at Bonyire; IFAD

had 8.2% at Anwonakrom but 1.2% at Bonyire.

The mean percentage of root rot for the various varieties ranged between 6.2% for Agbelifia and 0.0% for Tek Bankye. The value for Tek Bankye was significantly lower than those of Agbelifia and IFAD but was not different from the rest.

Discussion

Agronomic performance of the ten cassava varieties

Percentage establishment

The study recorded no significant differences of percentage establishment between the two locations where the research was carried out. The ability of cassava plants to sprout and be established was not affected by location effect. This confirms the findings of Doku (1969) that cassava is adaptable in all edaphic and climatic conditions of Ghana. Most varieties established well in both locations and recorded above 75% establishment, except a few which recorded below 70%, for example, Agbelifia, Esam Bankye and Doku Duade.

The differences in establishment among the various varieties could probably be due to the sources from which these planting materials were obtained. The stem cuttings of Adehye Bankye, Capevars Bankye, Bankye Botan, IFAD, Nkabom and Tek Bankye were obtained from the Asuansi Research Station in the Central Region, while Bankye Hemaa, Doku Duade, Agbelifia and Esam Bankye were obtained from Ejura Farms in the Ashanti Region. The cuttings from the two sources might have been handled differently prior to the application of any treatments and planting. The age of the cuttings might also be different among varieties. Two varieties, Esam Bankye and Doku Duade, which recorded low percentage establishment, also recorded low yield values of cassava even though they fell within the optimum or average yield for cassava in Ghana (Silvestre, 1989 ; Doku, 1969).

Wholesome roots

The bulk of the roots harvested for the ten varieties were wholesome and marketable except the few rotten and tiny roots. Tek Bankye recorded the highest percentage wholesome value of 91.0%, this was probably an indication that it was the most tolerant cassava variety to the root rot pathogens. IFAD recorded the lowest percentage wholesome roots of 69.0% but produced the highest starch yield.

The following, Doku Duade, Esam Bankye and Agbelifia, also established poorly at the two locations but were able to produce very high numbers of wholesome roots. On the other hand, IFAD had 100% establishment but produced fewer numbers of wholesome roots. These observations could perhaps be due to their distinctive characteristics and genetic traits.

Root rot

The prevalence of the fungus that causes root rot in all types of soils indicates the potential of the fungus as a threat to the cassava industry in the Western region where cassava is grown in mostly acidic soils.

Significant differences existed between the two locations for root rot disease. The soils at the two locations were highly acidic with a pH of 5.14 for Anwonakrom and 4.86 for Bonyire. Meanwhile the acidic soil content of the experimental sites was able to suppress the effect of the root rot disease contrarily to the report made by Cochrane (1958) that fungi grow best in media with initial pH of 5.0 to 6.5.

All the varieties tested at Anwonakrom were infected with the root rot disease except Tek Bankye and Doku Duade. The location mean recorded was 3.9%. The other eight varieties had varying degrees of infection with the most infected being IFAD with a value of 8.2%. The following varieties tested at Bonyire experimental site recorded no incidence of the root rot disease; Bankye Botan, Capevars Bankye, Esam Bankye, Adehye Bankye, Bankye Hemaa and Tek Bankye and the location mean was 1.3% which was significant from that of Anwonakrom. The observation above could probably be the history of the experimental sites. Anwonakrom experimental site had been used for the cultivation of cassava for some time. It also could be that the experimental site already had the pathogens or mycelia in the soil. This observation is in agreement with the report by IITA (1990) that the pathogen *Sclerotium rolfsii* survives in the soil as a saprophyte on various plant debris. Lozano and Booth (1974) also observed that dry root rot pathogens survive in the soil as dormant mycelia, rhizomorphs (*A. mellea* and *F. lignosus*) or as sclerotia (*S. rolfsii)* which are able to withstand unfavourable environmental conditions and serve as inocula in the following season.

The experimental site at Bonyire had no history of being used for the cultivation of cassava; four varieties were mildly infected by the root rot disease at the site. This could be attributed to the genetic traits of the varieties, and or probably the stem cuttings were infected with the pathogen before they were planted. Doku Duade showed a controversial behaviour; it was free from the root rot pathogen at Anwonakrom where most of the varieties were vulnerable, but rather had about 3.2% root rot at Bonyire.

The most infected variety was Agbelifia with a value of 6.2% as the varietal mean for the root rot disease. It recorded the highest infection at Bonyire with a value of 4.9%, and the second highest at Anwonakrom with a

value of 7.5%. This observation suggests that the Agbelifia variety is probably susceptible to the root rot disease pathogen no matter the ecological conditions prevailing. It was only Tek Bankye which was not infected with the root rot disease at both locations. The performance of Tek Bankye by recording 0.0% for root rot disease on acidic soils of Western region is contrary to the report made by Cochrane (1958) that fungi grow best in media with initial pH of 5.0 to 6.5. This observation might be due to cultivar differences (Okafor, 1966) due to differential genotypic sensitivities and the varying reactions of spores and mycelia of fungi to phytoalexins (Emehute *et al*, 1998). The characteristics of a plant may prevent the entry of a pathogen or restrict the pathogen to the point of entry (Clerk, 1974). He further reported that the plant characteristics may also inhibit the harmful effect of toxic substances produced by the pathogen or nullify the effect of the pathogen enzymes. Varietal differences in the quantity of anti-fungal phenolic compounds in tubers (yam) (Ogundana *et al*, 1984) might have accounted for these observations. Differences in the enzymes produced by the rot-causing pathogens (Obi & Moneke, 1986) may also contribute to their relative virulence observed with the various varieties of cassava. Tomkins (1951) has also shown that for a fungus to invade and spread in a tissue, the tissue must be suitable for fungal growth. He reported further that the infected tissues must stimulate the production of enzymes or metabolites which bring about killing and softening of tissues. The Tek Bankye variety recording no root rots at the two locations in this study could be a reflection of the chemical composition of its tissues.

Conclusions

The purpose of the study is to assess the agronomic performance of ten varieties of cassava in the Western Region on root rot disease. All varieties used except Tek Bankye were probably susceptible to the root rot disease even though the infection levels varied. The infections were influenced by location; the rot disease was more endemic at Anwonakrom than at Bonyire and Agona Junction. Unmarketable roots were generally produced by all the varieties.

The establishment of all varieties was good except Doku Duade and Esam Bankye which performed poorly.

Recommendation

Farmers in the Western region should be given the released improved varieties which are high yielding and resistant to activities of pathogens which cause root rot in cassava, for example, Tek Bankye.

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