

SURVEY OF BACTERIAL, FUNGAL AND VIRAL DISEASES OF POTATO (*Solanum tuberosum* L) IN AMPANG-WEST DISTRICT OF MANGU LOCAL GOVERNMENT AREA PLATEAU STATE

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ABSTRACT

A survey of bacterial, fungal and viral diseases of potato (*Solanum tuberosum* L) was conducted in August 2013 cropping season in some farms in villages of Ampang West District. The survey was carried out in six major villages by a random survey approach for selection of farms. The survey was carried out using Completely Randomized Design (CRD) with the villages considered as treatments and the farms as replicates. A picture book (CIP, 2009a) containing an overview and description of disease symptoms was used to help in field identification of the different diseases. Vascular flow test was also used to confirm bacterial infections. Percentage occurrences in the villages range from 1.29 to 6.03% infected by bacterial that by viral ranges from 4.39 to 18.40% and fungal infections ranges from 5.81 to 50.47%. There was a significant difference in percentage infections of these diseases amongst the villages. Level of infections were higher in Jirep village as compared to Ngo, Nga'al and Larpya villages, However infections by these diseases were statistically the same in Jirep Fwam and Chindom villages at 5% level of significance. These infections were attributed to the use of farmer's saved seeds obtained from previous season recycle over and over the years. It is therefore, recommended that training the farmer's on "select the best" (CIP 2009 b), a technique for seed selection in the production areas to reduce the multiple effects of these diseases. Government should also encourage the production of seed potatoes by private companies.

Keywords: Potato, Diseases, Bacteria, Fungi, Virus, Infection, Survey.

INTRODUCTION

Potato (*Solanum tuberosum* L) is the world fourth largest food crop following rice, wheat and maize. The crop is fairly new to sub-Saharan African (SSA) where it was introduced in the 19th century through the activities of European Missionaries (McNeil, 1999). The world production of potato in 2009 was estimated at 330 million tones and over two thirds of the global production is eaten directly by humans with the rest being fed to animals or used to produce starch (Wikipedia, 2010). Root and tuber crops have contributed significantly to the staple food requirement in many developing countries, ensuring food security at the national and household level. Their marketing service also as a major source of income and employment to the rural population in many African countries. These major roots and tuber crops used in Nigeria ranges from Cassava, yam, sweet potato, coco yam and Irish potato. These crops have been part of regular food habit of many Nigerians and major contributors to cross-substitution when other food stuffs are short in supply (FAO, 2008). Potato was introduced in Nigeria during 1920s probably by way of Germans living in the Cameroun and other Europeans involved in missions and Tin mining activities on the Jos plateau.

Production was limited to small garden plots until the second world war in 1939 when the British colonial government encouraged potato cultivation to help feed service men in west African (FAO, 2008) Akunde and Ibrahim, 2011). Potato is the most fruitful and efficient tuber crop in the world in terms of tuber yield and days to maturity. It matures in about 60-90 days as compared to 9 to 12 months for yam and cassava respectively (NRCRI, 2005, Kudi *et al*, 2008). It gives the highest yield per unit area among roots and tuber crops in Nigeria and also more income to farmers. This crop is cultivated in commercial quantities in Plateau and Taraba states in Nigeria (Okonkwo *et al*, 1995). A lot have been made in research and development programs and projects in an effort to improve potato productivity of small holder farmers in Nigeria; this is evident by the establishment of programs in Kuru near Jos in Plateau state. This, in turn have led to high level of activities in potato production and marketing all year round (Okonkwo *et al*, 1995). Mohammed (2009) noted that over 50,000 hectares of land have been under potato rain fed cropping season on the plateau every rainy season by individual cooperative groups, government agencies and the farmers. However, these efforts have focused on adoption of agronomic practice, introduction of high yielding varieties and storage facilities. The effect of climate change resulting in flooding rainy season farming encourages the establishment of diseases particularly high rainfall and relative humidity.

The importation of varieties of potato by the National Fadama II and III a world bank assisted programs and the Agricultural services Training center (ASTC) of plateau state Government requires research in the area of protection, since the most limiting factor in potato production are the seed borne diseases of potato (CIP 2009 b). Potato producers in the developing world face the problem of inadequate supply of certified seeds that the majority of small holders farmers almost solely depend on informal seed sources (farmers saved seeds, local markets and from neighbors') this, according to Muthoni and Nyamongo (2009) encourage the spread of seed-borne diseases from one cropping season to the next since farmers usually select seed from their own farms and periodically go outside their own farms to bring in (new) or(fresh) seeds (seed renewal). Okonkwo *et al*, (1995), Fane et al (2003), Muthoni and Nyamongo (2009) established that pests and diseases are serious challenges to potato production in developing world resulting in yield reduction. The bulk of potato produce in Nigeria comes from the Jos plateau (Dimlong, 2012) with Mangu local Government Area as a leading producing area, this study is aim at surveying potato diseases particularly Bacterial, Fungal and Viral in Ampang west a high potato producing District of Mangu. This will create awareness to farmers and to suggest ways to reduce infections.

MATERIALS AND METHODS

A survey of Bacterial, fungal and viral diseases of potato was conducted between August and September 2013 cropping season in potato farms in six major villages that made up Ampang-west District of Mangu local government area of plateau state. The survey was carried out in the villages by a random survey approach for selection of farms and using completely Randomized Design (CRD) with villages considered as treatments and farms as replicates (Ndor,2013). Diseases incidence was assessed by selecting eight rows per farm for assessment. Total number of diseased plants relative to total number of plants in each row multiplied by hundred obtained percentage (%) incidence of diseases per farm. This was carried out for each disease. A picture book (CIP, 2009 b) containing an overview of description and disease symptoms to help identify the different diseases was used. Where symptoms look similar, to ascertain are caused by bacterial wilt, the vascular flow test (VFT) is used. This involved the cutting of a wilting stem, place it in a clean glass of water, making sure the top of the stem piece faces up as it was in the plant. Within few minutes milky threads stream down from the stem piece if the wilting is caused by a bacteria. If tried 2-3 stems that were wilting not seen the flowing ooze, the wilting has been caused by something else (CIP, 2009a). Data obtained was

subjected to analysis of variance (ANOVA) using SPSS (1999) statistical software model, Means were separated using Duncan multiple Range test (DMRT).

RESULTS

Table 1 shows the percentage occurrences of viral, bacterial and fungal diseases in major villages of Ampang west. The villages of Chindom, Fwam and Jirep recorded significant differences in the occurrences of these major diseases where as their occurrences in Ngor, Nga'al and Larpya were statistically non-significant at 5% level of significance.

Table 1: Percentage Occurrences of Viral, Bacterial and Fungal Diseases in Major Villages of Ampang West District.

<u>Villages</u>	<u>Viral</u>	<u>Bacterial</u>	<u>Fungal</u>	<u>SEM</u>
Chindom	13.69	4.22b	20.91a	2.79*
Fwam	18.40ab	6.03b	31.72a	4.38*
Jirep	8.23b	2.76b	50.47a	7.61*
Ngor	14.15	5.59	5.81	2.48NS
Nga, al	14.75	1.29	30.25	6.62NS
Larpya	4.39	4.67	9.76	1.66NS

Means on the same row with different superscripts are significantly different ($P \geq 0.05$)

NS= Not significant at $P \leq 0.05$, SEM=Standard error of means.

In Chindom and Fwam villages, bacterial and fungal occurrences were significantly different but statistically the same in the occurrences of viral disease. Fungal infection was significantly higher in Jirep compared to viral and bacterial which are lower and the same statistically. Generally, fungal occurrences were marginally higher in Chindom and Fwam but statistically the same, however it is higher statistically in Jirep compared to viral and bacterial infections.

Percentage infections of different varieties by diseases in Ampang west are shown in Table 2. The varieties include Diamond, Ali, SP, Nicola and Pakistan cultivated by farmers in Ampang west District.

Table 2: Percentage Infections of Different Varieties by Diseases in Ampang West.

Varieties	Viral	Bacterial	Fungal	SEM
Diamond	15.98	7.88	15.84	3.53NS
Ali	10.90b	4.34b	25.22a	3.19*
SP	16.53ab	6.16b	27.39a	2.90*
Nicola	7.69b	3.02b	36.84a	6.26*
Pakistan	9.60	2.35	27.39	5.86NS

*a, b means on the same row with different superscripts are significantly different ($P \geq 0.05$)

NS- Not significant ($P \leq 0.05$) SEM=Standard error of means.

Fungal infection was significantly higher in Ali and Nicola.

Diseases infection in Ali, SP and Nicola were significantly different compared to Diamond and Pakistan. Infection of Ali, SP and Nicola are same by viral and bacterial diseases.

DISCUSSION

The viral, bacterial and fungal diseases have a multiple effect when the same potato seeds obtained from previous harvest are used as the case is with farmers in developing countries. Some of the low level infections of these diseases are not seen or detected (CIP2009b). This means that the survey cannot give the true percentage infection and percentage occurrences may be higher than recorded. Infections are higher during rain fed due to favorable conditions for infection.

CONCLUSION/RECOMMENDATIONS

A field survey of potato bacterial, fungal and viral diseases was conducted during the 2013 cropping season in farmers' fields in Ampang west District of Mangu local government Area of Plateau state. A picture book (CIP 200b) containing description of diseases symptoms was used to identify the diseases. Data was analyzed using completely Randomized Design (CRD) and means separated by Duncan multiple Range test (DMRT). The result shows that there were infections of the three important diseases (bacterial fungal and viral). These diseases are import in potato production since can cause damage of up to 100%. Many countries in the sub-Saharan Africa (SSA) such as Nigeria are in the process of expanding their potato production, which has often involved the importation of improved clones, the need for proper screening must be emphasized. A training of farmers on "selects the best" for seeds selections

need to be carried out in the production areas to reduce the use of infected seeds.

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