Global Scenario on Production of Tropical Root Crops and Threat of Climate Change in South Pacific

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Abstract

Tropical root crops such as cassava, sweet potatoes, yams, taro and potatoes are very important staple foods in the world with 765 million tonnes produced in 2010. Over a billion people regularly consume these crops as staple foods. The world annual per capita consumption of root crops is about 110kg; in the South Pacific Island Countries it is around 200kg. Most of the production and consumption of tropical root crops in the South Pacific Island Countries occur in subsistence and semi-subsistence settings. Climate change associated with global warming, in particular the predicted rise in sea-level by 1-1.5m by 2100AD, is expected to have a catastrophic impact on the livelihood of low-lying Pacific Island communities who are highly dependent on the production and consumption of tropical roots crops. The most devastating impact will be on atoll communities, such as in Kiribati and Tuvalu, where people live at elevations less than 3m above sea level. In other South Pacific Island Countries that have a significant number of low-lying islands or low land areas, such as in Fiji, Tonga, Cook Islands, Tokelau Islands, Vanuatu, Papua New Guinea, Solomon Islands, and Wallis and Futuna Islands, the rising sea-level will also severely impact on the livelihoods of a large number of tropical root crop producers and consumers.

Key words: Tropical root crops, production, consumption, climate change, South Pacific Island Countries

Progress in Yam Genome Sequencing and its Potential Applications

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Abstract

Although progress has been made in yam (*Dioscorea* spp.) improvement, targeting specific traits for successful and efficient breeding of the crop has remained difficult mainly due to poor understanding of its genetics. As part of the on-going IBRC/IITA/JIRCAS collaborative project on the "Use of genomic information and molecular tools for yam germplasm utilization and improvement for West Africa", we set out to generate the first Guinea yam (*D. rotundata*) genome draft sequence. To this end, Illumina high throughput Genome Analyzer II (GA II) was used to generate paired-end and mate-pair short reads corresponding to 24 Gb and 6 Gb sequences, which provided 24 and 10.6 coverage of *D. rotundata* genome that is estimated to be ~570 Mb, respectively. Paired-end short reads were assembled into 464,385 contigs with a total size of of 452 Mb, and a maximum contig size and N50 of 114 kb and 2.8 kb, respectively. These contigs were then combined with mate-pair reads to generate 358,012 scaffolded contigs with a combined size of 584 Mb having maximum size and N50 of 526 kb and 22 kb, respectively. Bacterial artificial chromosome (BAC) libraries were further constructed, and shallow sequencing and De Novo assembly of these libraries is underway. An additional sequence is being generated using the illumina HiSeq system to be combined with the contigs obtained so far to generate the longest possible contigs. The daft sequence of yam will represent an invaluable resource to study the evolution, phylogeny and domestication of *Dioscorea* species, as well as making the crop accessible for the application of techniques that make use of whole genome sequencing for genetics and genomics studies. Owing to the ever-decreasing cost of whole genome sequencing, we believe that this is an opportune time for making significant strides in availing genomic and molecular tools for the improvement of tropical root and tuber crops.

Key words: Contigs, de novo assembly, draft sequence, genome sequencing, yam

Global Cassava Utilization - Revisited

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Abstract

Traditionally cassava was considered to be a poor person's self-sufficiency crop and cassava trade was primarily restricted to tapioca and native starch for laundry or stamps and envelops. Research was limited primarily to a few "colonial" research stations.

In the 'sixties the establishment of the European Common Market, and its related price and trade policies, created a new market for chopped cassava roots. Chopped roots soon became chips and by the mid to late 'sixties cassava pellets became the major traded item. Paralleling the growth of the cassava pellet market was the expansion and improvement in the export of cassava starch. The resulting world trade in cassava continued to grow until the end of the 'eighties

Since the early 'nineties cassava exports declined for about ten years and then began to increase. During this same period cassava production basically kept pace with population growth in cassava producing countries – that is per capita production has been basically constant. This global picture of a constant per capita production, and decreasing and increasing trade masks substantial changes that have occurred in cassava consumption. These changes have occurred both in the international and domestic markets. During the past twenty years the number of cassava importing countries has increased, and in cassava producing countries consumption of cassava for non-food purposes has increased.

This paper will describe these changes and discuss their implications for the global cassava economy.

Key words: Cassava production, consumption, processing and trade trends

Realizing the potential of tropical root and tuber crops

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Tropical root and tuber are essential to the livelihoods of millions of poor people. They also have much to offer over the next twenty-five years as world addresses population growth, climate change, increasing food prices, urbanization, food security and poverty reduction. In his address, the President will review some of the progress made in tropical root and tuber crops research and development and highlight some of the important opportunities and contributions that these crops can make in the future to address these significant challenges.

Root and Tuber Crops in West and Central Africa Region

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Abstract

The cultivation and utilisation of starchy root and tuber crops in the West and Central Africa region is active and progressing. The region of 15 ECOWAS nations and 8 countries of Central Africa prefer the growing of cassava, yams, sweetpotato, cocoyams and potato. Fra fra potato in Northern Ghana, Hausa potato in Middle belt of Nigeria, and *Stenocarpum* are also grown in small quantities. Of these, cassava dominates as the chief staple and its uses comprise gari, fufu, tapioca, abacha, flours (fermented and unfermented). Nigeria has made great strides in the commercialisation of cassava as an import substitution commodity. Cameroon, Chad, Centrafrique, Congo, DR Congo, Sao Tome e Principe, Equatorial Guinea, and Gabon make wet cooked pastes (chikwangue that stores for up to a week in ambient conditions). Mechanisation of the crops has remained stagnant and the cultivation of large hectares is beginning to be seen in savanna agro-ecologies especially in southern guinea of Nigeria. Presidential initiatives have been undertaken on Nigeria and Ghana and recently the IFAD assisted root crop projects have been initiated in Cameroon and Ghana, as well as Nigeria. There is absence of techno-economic evaluation of many of the value chains so that the flow of investments is sluggish. Projects abound and these include Sweetpotato (SASHA, SPG Ibadan, ARCN-CARGS), UPOCA, C'AVA, Helen Keller Project, Bio-Cassava plus, Harvest Plus, and varied other interventions. One great challenge of all root and tuber crops systems is the high cost of seed and of labour for the highly labour intensive operations of these crops. The costs of production studies are poorly understood and the unit cost per tonne of fresh produce continues to be unfavourable to industrialists who are liberty to import semi-finished products, instead of local production. Support to research and farmer based development of the root and tuber crops sector has mainly come from UK, USA and EU countries. Funds for research and development have gone to IITA and national agricultural research institutes and extension agencies of government and foreign governments to service root and tuber crop systems as a means of assuring food security for peoples who depend on these crops for food and cash income generation.

Key words: Root and tuber crops, central Africa, production cost

Building a strong partnership for cassava development

Louw Burger

Sustaining the inclusion policy: our road map

Keith Sutherland

Genotype x Environment Interactions for a Diverse Set of Sweetpotato Clones Evaluated across Drought Prone Environments of Mozambique

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Abstract

Sweetpotato is grown during the rainyand during the dry season in Mozambique (the rainy season is very unstable). In total 58 clones were evaluated across three years during the dry season and with two treatments (with and without irrigation during the initial growing stages). Three check clones were used (Jonathan, Resisto, and Tanzania). The G x E analysis was conducted by ANOVA, regression, and AMMI analysis. Ratios of variance components due to genotypes, genotype x year, genotype x treatment, genotype x year x treatment, and the plot error were 1: 2.90:0.52:1.27: 3.98 for storage root yield and 1:0.45:0.13:0.29: 1.45 for upper biomass yield – corresponding heritabilities were 37.6 and 74.5, respectively. The stability of harvest index was significantly correlated with the PCA1 and PCA2 values obtained from AMMII analysis with storage root yields. Fifteen clones were found to have higher storage root yields compared to the best check (Resisto) with initial irrigation, whereas only four clones were found to have higher storage root yields compared to the best check (Tanzania) without initial irrigation. AMMI analysis revealed a group of genotypes with high additive main effects and PCA1 values close to zero for storage root yield. Moreover, a multiplicative index was tested to facilitate selection. In conclusion, storage root yield genotype by year; it can be extreme under drought prone growing conditions of sweetpotato. This makes right selection decisions and breeding progress difficult. Harvest index stability might be a key trait to identify clones with yield stability under drought prone growing conditions. At least two environments should be used at early breeding stages to consider this trait early in the breeding process.

Key words: Genotypes, heritabilities& stability of harvest index

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Transgenic RNAi-derived Field Resistance to Cassava Brown Streak Disease

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Abstract

Cassava brown steak disease (CBSD) caused by *Cassava brown streak virus* (CBSV) and *Uganda cassava brown streak virus* (UCBSV) is an emerging constraint to cassava production, and is one of the world's most serious threats to food security. The disease is transmitted by whitefly vector *Bemisia tabaci* and can result from single or dual infections by these two ssRNA viruses. Though recently identified in Uganda, CBSD has developed to become a significant threat to cassava production throughout the region. The disease produces yellow chlorosis on older leaves, stem lesions and most destructively, production of brown, corky, necrotic lesions within storage roots. Affected roots are largely inedible and have significantly reduced market value. As the second most important staple food, cassava plays a central role in food and economic security throughout much of East Africa. The impact of CBSD therefore has important implications for smallholder farmers and rural communities within the region. Development and deployment of farmer-preferred CBSD resistant germplasm is essential if the impact of the disease is to be mitigated. We recently reported transgenically imparted resistance to CBSD via RNAi technology in tobacco and module cassava variety under controlled growth conditions. In order to assess efficacy of siRNA-imparted resistance to CBSD under conditions of naturally vectored disease pressure, transgenic cassava plants were established under regulated field trial at the National Crops Resources Research Institute (NaCRRI), Namulonge, Uganda. The ability of field grown transgenic plants to resist infection and CBSD disease development in the presence of whitefly-transmitted CBSV and UCBSV will be discussed.

Key words: Transgenic, RNAi-derived Field Resistance, Cassava Brown Streak Disease

Comparison between Morphological and Molecular Markers in the Analysis of Genetic diversity in *Amorphophallus* Blume ex Decne.

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Abstract

Twenty five accessions of *Amorphophallus* which included seven wild species, sixteen morphotypes of *A. paeoniifolius* var. *paeoniifolius* and two popular cultivars of *A. paeoniifolius* var. *campanulatus viz.,* cv. 'Gajendra'(GJ) and 'Karunaikizhangu'(T10) from four biogeographic zones of India were evaluated using 47 morphological characters and 17 ISSR markers. ANOVA revealed significant differences among the accessions for all the quantitative traits and Shannon-Weiner Diversity Index was significant for qualitative characters. The first two principal components accounted for 56% variance attributed by corm and cormel characters. UPGMA cluster analysis based on morphological data revealed two principal clusters with first principal cluster represented by five wild species and all *A. paeoniifolius* accessions in the second principal cluster with GJ and T10 in two separate sub-clusters within second principal cluster. ISSR profile also showed almost similar clustering pattern confirming the specific status of *A. paeoniifolius* in spite of all the morphological variability observed in this complex. The accession T10 was placed separately as an outlier between the two clusters and associated with second cluster with a bootstrap value of 92% signifying its close relation to *A. paeoniifolius* group. This suggests that T10 may be assigned a separate varietal status which is different from var. *paeoniifolius* or var. *campanulatus.* This accession has not been assigned a separate status due to the lack of data on sexual reproductive phase of the plant. Though, Mantel test did not show a significant correlation, clustering based on both data was comparable. Morphological and molecular data suggests that the accessions GJ and T10 possibly passed through two separate evolving processes coupled with anthropogenic selection to elevate them as cultivated forms.

Keywords: *A.paeoniifolius* complex,ISSR markers, morphological descriptors,evolution

Phenotypic and Molecular Characterization of Released Sweetpotato varieties and Pathogen-tested putative ramets in Ghana

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Abstract

Officially released varieties in Ghana are all selections from exotic introductions. Following release, no effort was made to maintain pathogen-tested foundation seed stocks. Pathogen-tested plants of 4 released varieties were introduced to Ghana and compared with released varieties to confirm a) that they were the same varieties and b) to evaluate whether pathogen-tested planting material of these varieties could be used to increase yield and quality. Planting material of cultivars and introduced pathogen-tested materials of the same genotypes were field multiplied at Fumesua, Ghana, before planting in replicated trials at 2 locations during the 2011 growing season. Standard morphological descriptors and molecular markers were used to assess equality of genotypes, while yield and virus symptoms during growth were used to determine benefits of using pathogen-tested planting material. Morphologically, Otoo and Sauti were more similar to their putative ramets than Faara and Okumkom. Mogamba, the putative ramet of Otoo, recorded the highest yield among the pathogen-tested clones at the two locations, while also expressing low virus symptoms. Otoo also had the highest yield and lowest virus ratings among the released varieties. Tanzania a pathogen tested ramet of Sauti had the worst virus score across locations. TIS 3017 (CIP 440064), the pathogen-tested putative ramet of Faara did not yield well though it did not express severe virus symptoms.

Key words: Sweetpotato virus disease, DNA fingerprinting, morphological characterization

Morphological variability within a ploidy level in *Dioscorea alata* L. germplasm.

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Abstract

Earlier cytogenetic study and flow cytometry analysis on Dioscorea alata has revealed different ploidy levels. As a result of variation in ploidy levels, cytological irregularities leading to erratic flowering and unstable reproductive behavior were observed. Differences in ploidy level however, are reported not to be reflected by any unusual morphological features, and phenotypic differences are therefore expected to be greater within each ploidy level than between levels. The objective of this study was to determine the level of morphological variability existing among 32 clones of D. alata and ploidy level for subsequent genetic improvement. Clones were planted in a RCBD with three replications, planting 5 plants per plot. 17 morphological traits were elicited on three plants per plot, standardized and processed using principal component and cluster analysis. For ploidy analysis, samples were prepared following OTTO 1 and 2 procedures and the analysis was run through a Partec PA flow cytometer. A total of 68% of the total variance was explained by five principal components and based on flexible similarity distance, four clusters were selected. Six clones were females and fourteen were males while the rest exhibited monoecy. Only one ploidy level (4x) was observed for all the 32 accessions. It was concluded that a considerable amount of morphological variability in the 32 D. alata accessions although they are of the same ploidy they can be used for breeding process to increase inbreeding using mono-ecious clones.

Key words: Yam, Dioscorea alata, Ploidy level, Cytometry.

Progeny Selection for Productivity in Segregating Families of Cassava (*Manihot Esculenta*, Crantz)

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Abstract

Cassava (*Manihot esculenta*, Crantz) is an important staple crop in Angola. It is planted mostly by small scale farmers in the low and middle altitude and cover about three quarter of the planting area in the country. Recently, different diseases and pests decimated cassava crop in the Northern part of the country creating a vacuum in the country´s germplasm. In addition, today climatic conditions are not reliable to the growth and development of many crops. Cassava crop is an alternative that may reduce challenges due to climate change and food shortage. To increase the probability of the presence of interested genes in the local germplasm, exotic segregating cassava population was introduced. Seeds were pre-germinated under irrigation and later survivals plantlets transplanted in the field during the rainy season using spacing between and within rows of 1m x 1 m. Components of yield characteristics were measured and submitted to one way analysis of variance for descriptive statistics and correlation estimation among components using the Analytical Software STATISTIX 8. The results indicate 69.6% of the families bearing genes of interest from a total of 112 families transplanted. Giving the fact that the future population size should be high in order to increase the probability of success, it was decided to select on individual basis progenies that performance was above the general mean of the population, for cultivar development. The best indicator of productivity in segregating population should be based on the Weight of Total Plant (WTPL) as it has great correlation with others characteristics.

Keywords: Segregating population, selection, correlation.

Influence of plant density on the yield of three cassava varieties

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Abstract

In order to determine the influence of plant spacing on the root and shoot yield of cassava (*Manihot esculenta* Cranz) to optimize productivity of improved cassava varieties, field experiments were carried out using three genotypes with different branching habits (growth patterns). The genotypes used were IITA TMS I30572, IITA TMS I972205 and TME 419. IITA TMS I972205 is a low branching type while IITA TMS I30572 has medium branching. TME 419 is either unbranched or has very high branching depending on the location. The experimental design was a randomised complete block design with three replications and planted in three locations in Nigeria: Ibadan, Ubiaja and Mokwa. Three plant spacings were used: 1m by 1m, 1m by 0.75m and 1m X 0.5m. The experiment was repeated in two 12-month cassava cropping seasons 2006/2007 and 2007/2008. The plot size was 6m X 6m ($36m^2$). Response variable included evaluations of the major pests and diseases and agronomic data including root and shoot yield as well as dry matter content. Analysis of variance showed that plant spacing had no influence on root dry matter content. However, spacing influenced both the root and shoot yield of cassava in relation to growth habit of genotypes investigated. Overall, higher plant density tended to produce higher root yields suggesting that recommended plant density at planting should be higher than 1 m x 1 m.

Key words: Cassava, genotype, planting space, plant density, yield

Farmer Participatory Evaluation of 8 elite clones of cocoyam (*Xanthosoma sagittifolium,* Linn, Schott*)* at the orest groecological zone of Ghana

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Abstract.

Cocoyam is an important staple and a food security crop in Ghana. The consumption rate is about 54 kg/head/year and is second to cassava. Productivity of the crop (4.0-4.5 t/ha), however, is below the potential (about 7.0- 8.0 t/ha). Prominent among the reasons for the lower productivity is the unavailability of improved cultivars in the system. To bridge the productivity gap in Ghana, twenty cocoyam farmers (13 females and 7 males) were involved in a farmer participatory on-station evaluation of the crop at Fumesua (a rainforest agro ecological zone of the Ashanti Region of Ghana) for four years (2008/910-2011/12 growing seasons). Eight elite landrace clones of cocoyam (three white and 5 pink) were evaluated for high yield, tolerance to major diseases and pests and culinary properties. Phenotypic attributes evaluated at peak vegetative phase (24 WAP) were Plant height, Number of leaves and leaf area. At harvest (12 MAP) variables evaluated included number of cormels, weight of cormels, and yield per plant. Year x Clone interaction for all variables evaluated were significant. The clones also differed significantly in all the parameters evaluated. Leaf area, number of cormels and weight of cormels were all positively correlated with yield. Based on farmers' recommendation four clones (3 pink and 1 white) yielding between 5.3-6.2 t.ha-1 (higher than the locally cultivated – 4 .2 t ha-1), tolerant to major diseases / pest and having acceptable culinary properties have been proposed for release to farmers in Ghana in 2012.

Keywords: Xanthosoma sagittifolium, cocoyam.

Indigenous Climate-Change Adaptation and Mitigation Technologies for Sustainable Roots and Tuber Crop Productivity in Africa

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Abstract

Climate change is critical to unprecedented temperature rise, drought, desertification, sea level rise, flooding, ecosystem and agro-biodiversity degradation. These climatic anomalies directly affect the productivity of roots and tuber crops for the resource-poor farmers in sub-Saharan Africa. These farmers have developed their unique capacity to think, adapt to environmental changes, forecast, accumulate and pass on his intellectual wealth to subsequent generations through indigenous knowledge. These farmers have developed sustainable adaptation and mitigation technologies which have successfully reduced the scourge of climate change on roots and tuber crop production. Such technologies include: changing of planting dates, cover-cropping agro-forestry systems, use of local crop species, conservation agriculture and ecofarming systems that adapt and mitigate climate change impacts. The constraints posed by poverty, illiteracy and poor government policies on climate change have resulted to farmer's inability to adopt improved climate- change adaptation measures. The adoption of organic farming practices by resource- poor farmers forms the bedrock of culturally-acceptable, environmentally-friendly and sustainable indigenous technologies aimed at boosting roots and tuber crop productivity as well as adapting and mitigating climate change impacts in the sub-region The challenge is thus for the government to partner with these famers in the roots and tuber crop development enterprise via collaborative research.

Key words: Indigenous- Adaptation, mitigation technologies, roots, tubers

Adaptability of Irrigated Orange-fleshed Sweet potato (*Ipomoea batatas* [L.] Lam) Genotypes in different Agro-ecological zones of Malawi

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Abstract

Storage root yield and beta-carotene adaptability of eight orange-fleshed sweetpotato **(*Ipomoea batatas* /L.] Lam.) Genotypes were studied in three major agro-ecological zones of Malawi** to evaluate their performance under furrow irrigation conditions**. The s**ites were Maseya (<200masl), Bunda (750-1350masl) and Bembeke (>1350masl). Genotypes LU06/0527, LU06/0252, LU06/0428, LU06/0299, LU06/0258, BV/009, Kenya and Zondeni were used. A study was laid out in randomized complete block design with three replications per site. Beta-carotene was determined spectrophotometrically. Both beta carotene and storage root yield showed significant ($p<0.05$) differences within genotypes and across sites. Beta carotene was highest in LU06/0252 (6793.2µg/100g) followed by Zondeni (5620.9µg/100g). Beta carotene increased significantly with decreasing altitude. Beta carotene was highest at Maseya (4258.5µg/100g) followed by Bunda (3556.2µg/100g). This trend could be attributed to high temperatures at low altitude which promote carotenogenesis in tropical crops. Interestingly, the best genotype in beta carotene, LU06/0252, was also identified as relatively stable across sites according additive main effects and multiplicative interactions analysis (AMMI) and was considered for wider adaptation. LU06/0527 (20.8 t/ha) was the best yielding genotype followed by LU06/0252 (12.5t/ha) and LU06/0428 (11.7t/ha). Zondeni was the least with 6.4t/ha. Bunda produced highest yield (15.7t/ha) while Maseya was least (8.2t/ha). LU06/0252, BV/009 and LU06/0299 were stable genotypes according to AMMI biplots. Genotype by environment interactions greatly affected performance of sweetpotato genotypes consequently can slow down crop improvement programs. The study has also shown that sweetpotato can be produced under irrigated conditions as one way of adapting to effects of climate change.

Key words: Agro-ecological zones, AMMI analysis, Beta-carotene, orange-fleshed sweetpotato, storage root yield

Organic Production of Yams: An Eco-friendly Strategy for Sustainable Yield, Tuber Quality and Soil Health

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Abstract

Global consciousness of food safety, health and environmental issues has stimulated interest in alternative agricultural systems like organic farming. Yams (*Dioscorea* spp.) form an important food source in tropical countries mainly West Africa, South East Asia and the Caribbean**.** These are ethnic tuberous vegetables with high energy and medicinal values. Since information on organic farming of tuber crops is meagre, field experiments were conducted at the Central Tuber Crops Research Institute, India, during 2006-2011. The impact of organic, conventional and traditional production systems on yield, proximate composition and mineral content of tubers and soil physico-chemical and biological properties were evaluated in three species of *Dioscorea* (white yam: D*. rotundata*, greater yam: *D. alata* and lesser yam: *D. esculenta*). Organic farming (20.34 t ha^{-1}) produced 9% higher yield over conventional practice (18.64 t ha^{-1}). All the species responded well to organic management, which l**owered the bulk density, improved the water holding capacity (by 19%) and porosity of soil**. **Tuber quality was improved with** significantly higher Mg (139 mg $100g^{-1}$) and Mn (by 45%), slightly higher K, Ca, Zn (by 5-7%), dry matter (33.56%) and crude protein contents (1.92%). After 5 years, organic plots showed significantly higher available K and pH, by 0.46 unit, and higher soil organic matter by 14%. **The dehydrogenase enzyme activity (**1.174 **µg TPF formed g^{-1} soil h^{-1}), population of bacteria, fungi and** P solubilizers were promoted by 14%, 23%, 17% and 22% respectively. Technology involving farmyard manure, green manuring, neem cake, biofertilizers and ash was standardized.

Key words: Alternative farming, *Dioscorea* spp., productivity, tuber quality, soil quality

Improving farmers 'access to clean planting material through partnership in the value chain

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Abstract

Sweetpotato is an important food security crop in Rwanda grown mainly by women for household consumption and as a source of family income Sweetpotato production is faced with several constraints, among them the availability of clean planting of most varieties but more so of the new Vitamin A richOrange Fleshed Sweetpotato. This is limiting their potential to benefits producers, processors, and consumers as a source of food based vitamin A. Therefore an efficient sustainable seed system for multiplication and distribution of cleaning planting material to users is vital. Through a thorough need assessment, four districts were identified for OFSP promotion. Farmer based approach was used to develop an effective, rapid and sustainable chain for multiplication and to disseminate clean basic sweetpotato planting material from in vitro lab to subsequent multiplication sites. Public, research, private, development organization, and farmer group's partnership was paramount to clean, multiply, identify, organize and train farmers' groups in different modules. Most of the new varieties namely, Cacearpedo, Gihingamukungu, and Ukerewe possess preferred traits by farmers compared to their local ones. Now farmers know the importance of using clean planting cuttings as a factor to increase productivity when planted at right time. Initial comparison of harvest from two consecutive seasons, May to July 2011 and July to December 2011 the study finds an increase of yield of 27% for Cacearpedo, 22% for Ukerewe and 71% for 97-062. This can be attributed to improved technical support, adoption of better agriculture techniques, healthy vines, and on time vines availability.

Keywords: Orange Fleshed Sweetpotato (OFSP), clean material, Cuttings, sustainable seed system, partnership

The Effect of Temperature-Time Regime on the Proximate Composition and Reduction of Oxalate Content of Beetroot Juice

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Abstract

This study was conducted to determine the temperature time regime that will produce optimum proximate composition and reduction of oxalate in beetroot juice. The beetroots were washed and subjected to different temperature-time regime of cooking before extraction of juice from the roots. The Beetroot cooked at control temperature of 0°C contains 26± 0.00% oxalate while those cooked at different temperature of 20, 40, 60, 80 and 100°C for 4, 8, 12, 16 and 20min. respectively contains 25.33±0.57%, 28.00±0.57%, 28.00±0.00%, 32.00±0.00% and 22.00±0.00% oxalate respectively. Beetroot cooked 80°C for 16min. contained the highest amount of oxalate and those cooked at 100°C for 20min. contains the lowest amount of oxalate. There was significant reduction in oxalate due to cooking. Proximate analysis of cooked beetroot showed that the moisture content was high (93.17$\pm$0.05 and 93.17$\pm$0.15 at 0 and 100^{0}C) and the ash content was low (ranging from 0.20$\pm$0.00 – 0.10$\pm$0.00 and vitamin analysis showed that riboflavin ranged from 0.20$\pm$0.00 – 0.10$\pm$0.10-0.00, Ascorbic acid from 16$\pm$0.00 and thiamine from 0.20$\pm$0.00-0.10-0.00.

Key word: Beetroot, temperature-time, oxalate.

Cassava Value Chain Development in West Africa: Successes, Challenges and Lessons Learnt

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Abstract

The cassava value chain development project, as aimed, created enabling environment for selected beneficiaries in Nigeria, Benin Republic (BR) and Sierra Leone (SL) to produce maximally, for improved food security and livelihoods. Altogether, thirteen processing centres were upgraded and commissioned, and a pilot hybrid solar dryer constructed. Instant *fufu* flour and *gari* were formally registered with a Nigerian regulatory agent to boost their commercial value. Successfully, there was an overall increase of cassava yields to 13-18 t/ha in Nigeria, 20-25 t/ha in SL, and 15-20 t/ha BR, and the project recorded 4, 464 tons of *gari,* 130 tons of l*afun*, 85 tons of odorless *fufu*, 30 tons of tapioca and 6 tons of *kimpouka*. **The project attracted the attention of government and other development organizations for more supports and replication, and brought into global visibility through disseminations. The beneficiaries and local fabricators reported improved skills in product diversification and fabrication of standard processing equipment respectively while farmers were also multiplying and selling improved stems for more income. Some of the processors diversified income through piggery, using cassava peels as feed, and reported improved livelihood system, assets and outcomes.** Farming and processing clash, beneficiaries' low working capital and Country coordinators' competing primary assignments were some of the challenges faced in the project. Lesson learnt, **farmers would only undertake large-scale production if there is ready market. Effective cassava product marketing is still disorganized, and thus requires more inputs to strengthen trade associations and promotions.**

Key words: Beneficiaries, diversification, Income, processors, value Chain

Chemical Composition and the Effect of Processing on Oxalate Content of Cocoyam (*Xanthosoma sagittifolium)* and (*Colocasia esculenta)* Cormels

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Abstract

Xanthosoma sagittifolium and *Colocasia esculenta* species are tropical root crops commonly consumed in many countries in Africa. However, the crop is highly underutilized because of their high oxalate content. This work studied the chemical composition and the effect of processing technique on the oxalate content of the cormels of two *Xanthosoma sagittifolium* species and *Colocasia esculenta* cormels. A 3x3 factorial experimental design with cocoyam varieties (*Xanthosoma* (white-flesh), *Xanthosoma* (red-flesh) and *Colocasia*) and cormel section (distal, middle and apical) was performed to determine the chemical composition of the cormels. Oxalate content of the various cormels were also evaluated and the effect of processing assessed using standard analytical methods. Results on the proximate composition of the three cocoyam species evaluated were; crude protein 2.98-5.50 g/100g, total fat 0.28-0.97 g/100g, ash 1.56-2.98 g/100g, starch 12.23-36.04 g/100g and crude fibre 1.11-3.00 g/100g. The results showed that the different sections of the cocoyam cormels studied were significantly different ($p \leq 0.05$) in chemical composition. The apical section of all the species had high protein content while the distal section had high levels of ash, fibre and minerals. Potassium was the most abundant mineral (763.05-1451 µg/100g) with appreciable amounts noted for zinc (16.98-51.09 µg/100g), magnesium (46.71-85.03 µg/100g) and phosphorus (41.58-63-07 µg/100g). Oxalate compositions of the fresh samples were in the range of 253.49-380.55 µg/100g for the *Xanthosoma sagittifolium* (red-flesh), 302.19-322.82 µg/100g for the *Xanthosoma sagittifolium* (white-flesh) and 328.4-459.85 µg/100g for the *Colocasia esculenta*. No significant differences ($p \leq 0.05$) were found between the oven-dried and solar-dried samples. However, drum drying reduced the oxalate levels by approximately 50% to average levels ranging from 99.94-191.16 µg/100g, suggesting that heat processing could be used to drastically reduce oxalates in cocoyam cormels to promote their consumption.

Key words: Chemical composition, effect of processing, oxalate content of cocoyam (*Xanthosoma sagittifolium)*, (*Colocasia esculenta)* Cormels

Physicochemical Properties of Sweet Potato Flours as Affected by Processing Methods in Sierra Leone

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Abstract

Roots of three different sweet potato varieties [Slipot II, Slipot III and a Local (Pa-Usman) variety] harvested 105 days after harvest, were processed into flour using three different processing methods (sweet potato flour from dry chips, flour from limed chips (lime/water ratio: 16/600) and that obtained from grating). The flours were evaluated for their physicochemical properties (swelling power, water absorption capacity, bulk density, angle of repose and moisture content). Results pointed out that sweet potato flours from all the sources considered (variety, processing methods and fertilizer treatment) produced angles of repose up to 35 degrees indicating free flow ability with some amount of cohesiveness. Angles of repose obtained from the respective sweet potato flours were greater compared to that of wheat flour (30.86^{o}). Sweet potato flour obtained by the grating method yielded lower loose and tap bulk densities compared to those obtained from dry chips (method I and method II). The bulk densities (loose and tap) obtained from the respective sweet potato flours were low compared to wheat flour making sweet potato flour suitable for the formulation of high nutrient density weaning food. The slight difference between loose and tap bulk density also offer sweet potato flour a packaging advantage. Flours obtained from the improved varieties (Slipot II and Slipot III) swelled more than the local variety. Swelling powers and water absorption capacity of sweet potato flours obtained from the different processing methods and varieties varied significantly ($p < 0.05$). Moisture was significantly affected by the different sweet potato varieties. Also flour obtained by processing method I had moisture content significantly different from processing methods II and III. Sweet potato flours irrespective of variety and processing method, yielded moisture contents (average- l2.57%) lower than the normal (14%). This provides the flours an advantage with regards to their shelf life.

Key words: Physico-chemical properties, processing method, variety, Sweet potato flour

Sensory Evaluation and Consumer Acceptability of Orange-Fleshed Sweetpotato by Pregnant Women and Children <2 Years In Western Kenya

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Abstract

The purpose of this study was to evaluate how two new high β-carotene sweetpotato varieties, Vita and Kabode were assessed against local checks by pregnant women (n=79) and how young children (72) under 2 years of age liked them in Bungoma and Busia districts of Kenya. **Mothers gave acceptability scores for how they perceived their children's acceptance. All respondents were selected from health facilities.** Attractiveness of flesh color, in Bungoma the scores of the three varieties were very close together, whereas in Busia the local check was scored highest. **The acceptance of the root texture of the local check in the two districts was higher than of the two new varieties (local check: 4.00, Kabode: 3.27, Vita: 3.00).** The local check was perceived as not fibrous in Bungoma compared to a little fibrous in Busia. In Busia, Kabode was perceived as the least fibrous variety, whereas in Bungoma the local check was the least fibrous and Vita was perceived as less fibrous than Kabode. Comparing the scores of the three varieties per district, in Bungoma the preferred variety in terms of taste/flavor was Kabode, followed by the local check and Vita. In Busia, it was the local check, followed by Vita and then Kabode with the scores of the latter two being close together. O**verall all three varieties were acceptable to pregnant women since the average scores were higher than 3 (local check: 4.13, Vita: 3.23, Kabode: 3.52). Between the two new varieties, Kabode was scored on average higher than Vita.**

Key words: Sweetpotato; sensory evaluation; child, pregnant mothers, consumer acceptability

Minimally Processed Yam Fries- The Effect of Blanching and Parfrying Pretreatments on Product Quality

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Abstract

As part of efforts at expanding yam utilization through the production of minimally processed frozen yam chips similar to frozen potato chips for the production of French fries, this study investigated the effects of blanching and parfrying as pre-freezing treatments for yam chips on the quality of "yam fries". Yam chips (1 cm^2 cross sections × 6-7cm lengths) prepared from two elite local cultivars, *Puna* and *Bayere Fitaa* (BF), of white yam (*D. rotundata)* were blanched at 70°C for 5, 10 and 15 minutes and at 90°C for 2.5 and 5 minutes. Blanched chips were parfried at 180°C for 10, 20 and 30 seconds and frozen (-12C) for 5-days. The effects of these treatments on quality: colour, moisture and oil content of fried (180°C for 4minutes) chips were then examined. Puna chips had more desirable appearance (brighter, more yellow, less red) and moisture content (lower) while BF chips showed more desirable oil content (lower). Blanching treatments impacted product quality with samples blanched at a lower temperature (70°C) having the most desirable attributes: lower moisture and oil contents, brighter, more yellow and less red appearance. The effect of parfrying on quality was related to oil content of fried chips. Within cultivars, significant interactions were observed between blanching treatment and parfrying time for all the quality indices measured except moisture content of fried "puna" chips. Blanching at 70°C followed by parfrying can be used to produce yam fries with desirable quality attributes.

Key words: Processed yam fries, blanching, parfrying, pretreatments, product quality

Cassava Cultivation as Panacea to Poverty Reduction and Food Security in Nigeria

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Abstract

Cassava, (*Manihot esculenta C*.,) is believed to have been introduced into Nigeria in the early 1550 by Portuguese traders. Although cassava is regarded as universal food provider in the humid region of southern part of Nigeria, it's a staple food for millions of Nigerians; the crop has contributed significantly to income generation and nutritional well being of the people in Nigeria in the past, present and future. Because of the economic importance of the products of cassava to the country in general, the Nigerian Root Crops Research Institute initiated research on cassava several years ago with collection and establishment of cassava germplasm materials in Nigeria. Our country is regarded as one of the leading producer of cassava in the world. Two cultivars are distinguished for cultivation; early ripening cultivars which were mainly grown in the North are harvested after 6-9 months, have low linamarin content and are usually used fresh (sweet cassava); and late ripening, high yielding cultivars, which mostly have a high linamarin content are usually harvested 18-24months after planting, are grown mainly in the south and are mostly used for the production of flour, starch, animal fodder and as a raw material for processing industry. Cassava gives the highest yields of all root crops with relatively simple cultivation, and that the roots can stay in the ground for several years without deteriorating, it often serves as a food reserve for times of need unlike other root crops which can deteriorate quickly.

Key words: Germplasm, cultivars, linamarin

Production and Marketing of Taro in Papua New Guinea

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Abstract

The research was carried out to identify problems in production and marketing of taro in the Huon Gulf District, Morobe Province in Papua New Guinea. Socio economic characteristics of the farmers, problems faced by them in production and marketing of taro and also preferences of growing taro over other crops were investigated. Training needs of taro farmers were also identified. Fifty farmers (50) were randomly selected from five villages in the Huon Gulf District. Middle aged and married farmers were more efficient and had great interest to adopt skills and techniques for producing and marketing of taro. Interestingly more than two-thirds (82%) of the farmers' engaged in taro production were female. Fifty four (54%) farmers completed community school education. Sixty-four per cent (64%) of the taro farmers had 4 to 7 family members. The farm size ranged from 0 to 2 hectares with majority of them having farm sizes of 0.05 to 1 hectare. Forty-six per cent (46%) farmers belonged to medium income group and seventy-four per cent (74%) farmers had short farming experience. Top ranked problem farmers faced in producing taro was plant protection followed by lack of storing facilities and lack of improved suckers. The top marketing problem of taro was unstable market price followed by poor transportation and lack of market information. Most farmers were not interested to attend any training regarding taro production. Farmers preferred to cultivate peanut as a substitute crop over taro. An Industry Act to regulate taro market like other cash crops may help to improve marketing system of taro in PNG.

Key words; Taro, production, marketing, problem and training needs

Farmer Practices in Small scale Potato (*Solanum tuberosum* L) Production System in Kenya

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Abstract

A field survey was conducted in four major potato growing areas in Kenya (Kiambu, Nyandarua, Meru and Molo Counties) during January and February, 2008 (short rains crop) and June 2008 (long rains crop) to determine the occurrence of predators, parasitoids and pathogens of the aphids *Myzus persicae* Sulzer and *Aphis gossypii* Glover in potato crops. In each of the four areas, 30 potato farms distributed in different parts of the survey area were selected at random for the surveys. At each farm, the survey started with the collection of basic data about the farm using a survey questionnaire. The data collected and recorded included physical and geographical location of the farm, GPS coordinates and data on cultural and agronomic practices on the farm e.g. potato variety grown, pesticide use, use of irrigation on the farm and other crops grown on the farm. This was used to correlate the occurrence or lack of occurrence of some insect species with the practices on the farm or the geographical positioning of the farms. This paper presents results of the responses by farmers on the different cultural and agronomic practices used on the small scale potato farms in Kenya.

Key words: *Solanum tuberosum* L, farmer practices, field Survey.

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Science and Technology for Enhancing the Contribution of Tropical Root Crops to Development in ACP countries

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Abstract

Agriculture continues to be the economic mainstay of most Eastern and Southern African nations. National economies remain highly dependent on agriculture as a source of employment and income. Co-operatives have emerged as the best tool to help rural small scale producers to overcome many of the challenges faced within the era of globalization. Managed prudently, co-operatives can benefit from the many innovative products and services offered in the market. For example, microfinance institutions (MFIs) or community-based financial organizations can link up with producer organizations to provide small input loans to producers, while banks can provide investment loans to processing companies, including co-operatives and leverage the financial capacities of community organizations and MFIs. Moreover, a good number of co-operatives stand out as success cases having adopted innovative value chain upgrading strategies/interventions in their respective enterprises. However, agricultural productivity in Africa remains lower than in other continents, resulting in slow development of rural areas and low farmer incomes. The functioning of agricultural value chains in Africa is adversely affected by the fragmentation of agricultural sector players and a whole range of production, transport, storage and market issues.

There is widespread agreement that economic growth can be a major driver for reducing poverty. The concept of "value chain promotion" has emerged as an important tool for pro-poor economic development; the value chain approach helps to address issues of economic change that are critical to the poor. In the era of globalization, value chain promotion is mainly related to the competitiveness of food production, rural industries and light manufacturing that provide livelihoods for large numbers of people. In most weak economies, business communities need to get much better organized and become more market-oriented. The investment of government and private enterprises has to be coordinated. What is needed is upscaling of successful cases and a range of highly flexible and innovative methodologies that can be adjusted to specific needs of different regional and product contexts. The current global financial crisis should also be taken into account in such interventions. Although rural populations are not directly connected to the international financial system, their markets and their financial institutions are affected by it. Financial institutions relying on external funding definitely felt the crisis. The effects on local economies have been significant, starting with agricultural exports. As these effects trickle down they affect the development of rural areas in the region. There is a clear need to identify best practices in value chain analysis and subsequent promotion interventions. Important questions remain if, when and where in the value chain to intervene; with what products; through which structures; how to ensure mutually beneficial relations between chain actors and service providers; how to upscale interventions; and how to build viable business cases for service providers to step in.

Resource Use Efficiency and Profitability Analysis of Sweet Potato Production in Kano State, Nigeria.

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Abstract

This study examined the resource use efficiency and profitability of sweet potato in Kura Local Government Area, Kano State. The primary data used in the study were obtained with a two – stage sampling technique using structured questionnaires administered on 80 sweet potato farmers (respondents). Descriptive statistics, gross margin and regression analysis were used for the analysis of data. Estimated gross margin was N 35,200/ha with an output/input ratio of 2.40 which shows that sweet potato production is profitable in the study area.52% of the farmers were using manual labour as compared to the ones using machinery. The regression result shows that fertilizer, seed (vines) and agrochemicals were positive and significantly at 5% related to output (Y). The R^2 of 65 % indicates that 65 percent of the variations in dependent variables were explained by the independent variables. Measure of the resource use efficiency shows that all the resources used by the farmers were not efficiently utilized. It is recommended that sweet potato production should be increased. Efforts should be made by researchers on product and market development as well as measures to solve the short storage life and perishable nature of sweet-potatoes. Inputs such as fertilizer, agrochemicals and farm macchinery should be subsidized to encourage the use, as this will go a long way to increase production.

Key words: Resource use efficiency, sweet potato, production.

Propagation of Yams (*Dioscorea rotundata*) Using Sprouted Tuber-heads

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Abstract

The tuber-head is the corm-like structure found at the head region of the yam tuber linking the vine to the tuber. While in storage, a new sprout often emerges from the tuber-head and farmers prefer using seed tubers which possess the tuber-head. However, for ware tubers, the structure is detached and discarded because it is too fibrous and corky for use as food. Investigations were carried out on the possibility of using sprouted tuber-heads for yam production at IITA Station, Kubwa, Abuja, Nigeria, during the 2010 and 2011 planting seasons. Sprouted tuber-heads of two popular commercial varieties, Meccakusa and Ame, were planted in a randomized complete block design, while another set of six varieties (TDr 99/02674, TDr 94/01108, TDr 95/18949, TDr 95/19158, TDr 89/02672 and Meccakusa) were planted in non replicated plots for preliminary observations. In the first experiment, results showed that survival of plants at harvest was 64.5% for Meccakusa and 47.2% for Ame. Mean weights of tubers produced were 443 g and 333 g for Meccakusa and Ame, respectively. These weights are greater than the 200-250 g recommended for seed tubers. Preliminary results of the other six varieties showed that 71-91.6% of tubers from five of the varieties weighed more than 150 g. Meccakusa had more than 10% of its tubers weighing >1000 g with a maximum tuber weight of 4706 g. The study thus revealed that sprouted tuber-heads which are often wasted could be used to produce yams with more seed than ware tubers.

Keywords: *Dioscorea rotundata*, Tuber-heads, Propagation

Cassava Improvement in Africa, Challenges to Emerging Value Chains

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Abstract

Cassava (*Manihot esculanta* Crantz) is grown in Africa mainly as a food crop while in other parts of the tropical world; it plays an important role as raw material for industries. However, tremendous progress has been observed in Africa in the past two decades in countries like Nigeria, South Africa and Ghana on the industrial uses of cassava. This trend is also being observed in D.R. Congo, Tanzania, Malawi, Mozambique, Congo, Cameroon, etc.

Cassava improvement in Africa was, until in recent past years, targeting small scale farmers for food security. Thus, all technologies were developed for low inputs requirements, local food preferences and adaptation to local agro-ecologies. In many countries, the adoption rate of improved varieties and other technologies released only for local food systems was not very impressive.

In the late 90's, IITA and some NARS started looking at main potential value cassava chains (high quality cassava flour for bread and biscuits, starch, ethanol, animal feed, food, other industrial uses like plywood, etc.). This prompted research for development to start considering industrial traits and agronomic practices for competitive production. This called for practical models on integrated agricultural research for development which takes into accounts all important stakeholders in the value chains to address development and industrial needs. Cassava root yield of 35 to 50 t/ha produced at lower cost to compete to imported products and at the same time to be competitive in international export markets has become one of the main objectives in technology development. This calls for a change in mind in R4D in Africa.

Cassava production in Africa still relies heavily at about 95% with small scale farmers using farming systems not well adapted to commercial production. An integrated approach of genetic improvement, natural resources management, post-harvest technologies, commercialization and policy incentives should be considered for cassava improvement to respond to challenges of shifting from subsistence production only to commercial production and how the farmers will position themselves in many value chains.

Keywords: Cassava, improvement, challenges, value chains.

Incidence, Severity and Prevalence of the Cassava Mosaic Geminivirus in Sierra Leone

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Abstract

Cassava is the most important root and tuber crop in Sierra Leone. Its low yield (FAOSTAT, 2005) can be attributed to several production-limiting factors including cassava mosaic disease (CMD). This study examined in a much wider scope the prevalence, distribution, incidence and level of severity of the cassava mosaic disease within the cassava farming communities across major agro ecologies in Sierra Leone.
A survey was conducted October, 2009.Field Assessment was also conducted on farms evaluated. Data collection was collected on the spot and complimented with group discussions and interviews. Field coordinates were recorded using the Global positioning system (GPS).
This study showed a country wide the prevalence of 85.2% out of 156 sites visited using GPS mapping. The Rain forest ecology had the highest prevalence of 97.2% while the coastal plain had the lowest disease prevalence. Incidence of cassava mosaic disease per district was generally high. Tonkolili district recorded the highest incidence of 99.2% followed by Kailahum and Pujehun. Bonthe district had the lowest severity score while pujehun district had the highest severity score. Difference in CMD infection was also observed in terms of agro ecology.
The result from this study indicates the need for an increased adoption of mosaic free cassava genotypes that are high yielding, has good cooking quality and with the ability to replace the local choice variety without significantly altering the cultural and aesthetic quality of the generally accepted local cultivar.

Key words: Cassava Mosaic, incidence, severity, prevalence

Managing Millipedes Infestation on Cassava and Cocoyam in the Western Region of Ghana

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Abstract

Millipedes live in and feed on rotten leaves, wood, and moist decaying plant matter, serving as beneficial arthropods. Occasionally, when conditions are favourable they develop high populations and invade farms. They feed on several crops including root and tubers. Millipede infestation have been identified as a major contributing factor to low root yield of cassava in the western region, Ghana. This study was to assess the pest status of millipedes on cassava and cocoyam and to propose management strategies to enhance cassava and cocoyam production. Participatory Rural Appraisal approach, questionnaires, field observations, damage assessment and chemical treatment of cassava cuttings prior to planting has been conducted. In order of magnitude, the Mpohor Wassa East, Prestea Huni-valley and Wassa Amemfi East districts have been identified as hot spots for millipedes' infestation. Although, high numbers of millipedes were found in the soil, the damage on promptly harvested cassava roots were minimal (less than 10%). The damage on planted cassava cuttings was very severe, ranging from 10-100%, causing most of the cuttings to die. Generally, millipedes' damage on cocoyam was much lower than on cassava, and was quite higher on corms than comels. The researchers and stakeholders have identified the promotion of farm hygiene, and the chemical treatment of cassava cuttings before planting as immediate interventions. Chemical treatment of cassava cuttings through dipping protected over 95% of newly emerging cassava buds from been attacked by the millipedes. Monitored and prompt harvesting of cassava roots and cocoyam cormels is recommended to minimize the damage.

Keywords: Millipedes, cassava, cocoyam, chemical treatment, farm hygiene

Integrated Field Management of Aphids (*Myzus persicae* Sulzer and *Aphis gossypii* Glover together) on Potato Using bio-pesticides

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Abstract

Potato (*Solanum tuberosum* L.) is cultivated in India in a commercial scale and this crop is susceptible to various insect pests of which aphids (both *Myzus persicae* Sulzer and *Aphis gossypii* Glover) cause heavy damage especially by spreading virus diseases. Studies were made to evaluate efficacy of extracts from plants such as ***Pongamia pinnata L. and*** *Nicotiana tabacum* L. and *Polygonum hydropiper*, botanical insecticide such as azadirachtin (1500ppm), **against** aphids **infesting potato crop under field conditions of the** sub-Himalayan region of north-east India **during the rabi season. Methanol was used as solvent for extracting from fruits of *Pongamia* and floral part of** *Polygonum* **and water for leaves of *Nicotiana tabacum.*** Imidacloprid (Confidor 17.8 SL) was used as check. **Three sprays at 10-day intervals were made, starting with the initiation of infestation. Total aphid numbers (**nymphs and adults of both aphids together**) per plant were counted at 4 and 9 days after treatment.** Imidacloprid was found the most effective treatment for controlling **aphid, followed by** plant extract of *Polygonum flower at 5 % concentration*. From overall observation it was revealed that plant extract of *Polygonum flower at 5 % concentration and* tobacco leaf extract at 10 % concentration gave satisfactory result, recording more than 70 % and 65 % aphid suppression respectively. The botanical insecticide azadirachtin **was also found very effective against** aphid, **achieving more than 60%** suppression. B**io-pesticides have less or no hazardous effects on human health and the environment, and therefore, they can be incorporated in IPM programmes and organic farming.**

Key words: Botanical extracts, botanical insecticide, vegetable IPM, organic farming

Acceptance of Root and Tuber Crops in Research and Development related to Africa.

Keith, Tomlins , J.V. Meenakshi, Chowdhury, S., Owori, C., Menya, G., Bechoff, A, Rees, D., Ball, A. M., Young, S. and Westby, A., Ndunguru, G., Stambul, K., Joshua, N., Ngendello, T., Rwiza, E., Amour, R., Ramadhani, B., Kapande, A. Sanni, L., Oyewole, O., Dipeolu, A., Ayinde, I., Adebayo, K. Nyango, A., Kapinga, R., Rees, D., Jolliffe, F., JaquelinoMassingue, Richard Dove, AlexandreBarroso, Harriet Nsubagaand Julius Okwadi.

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Abstract:

Root and tuber crops and their products are important for the diets of millions of people in Africa. Akey factor driving consumption is acceptability.A knowledge of the sensory aspects of root and tuber is critical so that acceptance can be understood. In this paper the acceptance of cassava, sweet potato and yams in scientific literature is explored and reviewed. Consumer acceptance has been employed in plant breeding including new biofortified varieties and in the development of new products. This is becoming increasingly relevant with the need to develop higher yielding crops, more nutritious crops (biofortification) and with changing consumption patterns resulting from urbanisation and the rise of higher income groups.

Key words: Root and tuber crops, sensory, consumer, acceptance

An Assessment of Cassava Health in relation to foliar Diseases in Osun State Nigeria.

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Abstract

Cassava (*Manihotesculenta*Crantz) is an important food crop in Nigeria and it is often cultivated in small scale by rural households as a food security crop. The tubers are processed and consumed in various forms. However, yields are considered to be very low in the most important producing country of the world due to the effects of pests and diseases. Surveys were conducted in 2009 and 2010 to assess the health status of the crop in Osun State in relation to foliar diseases. Sixty cassava fields were assessed spanning three agroecological zones. Cassava Mosaic Disease (CMD), Cassava Bacterial blight (CBB) and Cassava Anthracnose Disease (CAD) were observed to be the major foliar diseases of cassava in Osun State. CMD occurred in all fields (93-100%) and at high severities (2.8 -4.2) while CAD had a mean occurrence of 28- 38% with 1.8-2.5 mean severities. CBB had the least percentage occurrence (10.3 - 18%) and severities (1.8-2.2) in all the zones when compared with the other two foliar diseases. The results indicated that the forest/savannaagroecology had higher occurrences as well as severities of the three foliar diseases while the least were observed in the savannaagroecology. Disease management strategies are required to improve the health status of cassava in the state to enhance productivity.

Keywords: Cassava, foliar diseases, osun State, productivity.

Evaluation of Local and Elite Cassava Genotypes for Resistance to Cassava Brown Streak Disease (CBSD) in Uganda

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Abstract

Cassava production in the East African region is seriously being constrained by the devastating cassava brown streak disease (CBSD) that causes characteristic above and below ground symptoms, making cassava roots unfit for human consumption. Development of cassava varieties that are resistant and /or tolerant to CBSD is an important component in the CBSD management. Therefore, the main purpose of this study was: to evaluate both local and elite cassava genotypes for possible sources of resistance to CBSD. 116 cassava genotypes were screened for CBSD resistance under field conditions. The experiment was laid out using a randomized completely block design (RCBD) with three replicates at Namulonge where CBSD pressure is high. A single row plot of six plants per genotype was used. CBSD data were collected monthly for a period of 12 months. Results indicated that foliar and root incidences and severities varied significantly among genotypes ($P<0.001$). All the local genotypes showed foliar CBSD symptoms with incidence ranging from 0 to 98% and severity from 1 to 3.23 whereas; ten of the elite genotypes did not show foliar symptoms. The genotypes NASE 1, MM96/4271, CR 20A–1, TZ06/130, MM96/0686 and MM96/0876 were consistently associated with low CBSD as they had both foliar and root incidence and severity of zero (0) and one (1) respectively and thus, can be considered parental breeding stock for CBSD resistance breeding. There was a further strong association between CBSD foliar and root symptom as most genotypes that showed foliar symptoms showed root necrosis.

Key words: Disease pressure, resistance, root necrosis, severity, incidence.

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Farmers' traditional knowledge about climate change and its influence on the distribution and importance of major pests and coping strategies in cassava fields of Northwestern Zambia

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Abstract

It is recognized that farmers are the custodians of valuable indigenous and traditional knowledge about plants and that over the years farmers have discovered various means of coping with plant pests and diseases in their own environments. To ***obtain information on farmer's perception of climate change and its influence on the distribution and importance of major cassava pests and traditional coping strategies thereof, a participatory research was undertaken in Northwestern Zambia. Individual interviews and focus group discussions were used to gather traditional knowledge about the changes in rainfall and temperatures and resulting impact on pest prevalence and damage in cassava fields over the past ten years. The influence of climate change on plant attributes that are associated with reduced pest population and or damage in cassava fields was also discussed, with a view to identify traits that can be promoted*** through breeding. Termites, mole rats, white scales, cassava green mites, and mealybug were recognized as the most important pests that are highly influenced by climate change. These pests contribute to low yields, and even abandonment of certain cassava cultivars by farmers. Plant canopy size and other related attributes such as number of branches, leaf retention capacity and stay green ability, and plant height were said to be highly influenced by climate change and have a negative relationship with pest damage. De-topping and frequent harvesting of cassava leaves, selective pruning, intercropping, trapping and digging, and burning are some of the traditional cultural practices used to reduce insect pest populations and damage in cassava. The effectiveness of such strategies was also discussed. The study revealed that farmers have kept a record of history about meteorological events and are able to associate pest population dynamics with changes in temperature and rainfall patterns in their localities.

Key words: Farmers' traditional knowledge, climate change, influence, distribution and importance of major pests, coping strategies in cassava fields of Northwestern Zambia

Quantitative Detection of *African Cassava Mosaic virus* and *East African Cassava Mosaic virus* using TaqMan Real Time PCR

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Abstract

A TaqMan real time PCR (RT-PCR) method was developed for the quantitative detection of *African cassava mosaic virus* (ACMV) and *East African cassava mosaic virus* (EACMV), and related EACMV species involved in the etiology of cassava mosaic disease (CMD) in sub-Saharan Africa. **Two sets of** primers and two probes, one set each for ACMV and EACMV, were designed. The primer pair and probe for ACMV was designed from nucleotide sequences of AC1 gene of all ACMV strains available in the NCBI GenBank amplifies a 171 bp fragment; whilst the primer pair and probe for EACMV detection was designed from nucleotide sequences of AV1 gene of several EACMV species and strains which amplifies 153 bp fragment. Ubiquitin10 (UBQ10) gene was used as an endogenous control to normalize template quantity in samples. This assay was validated using a range of cassava samples comprising different varieties and geographic locations in different countries. This assay was hundred times more sensitive than the corresponding conventional PCR and revealed variable concentration of ACMV and EACMV in case of mixed infections. The method was also found suitable for quantitative detection of ACMV and EACMV in vector whitefly, *Bemisia tabaci*. This assay is useful for the relative and absolute quantification of CMD causing begomoviruses in cassava, and has a great potential in characterization of resistance mechanisms and genetic studies.

Key words: Quantitative detection, African cassava mosaic virus, East African cassava mosaic virus, TaqMan Real Time PCR

Safe Exchange of Cassava and Yam Germplasm

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Abstract

Crop germplasm is a high value commodity exchanged at a high frequency for agriculture research, food production and commerce. International exchange of useful germplasm has been the major factor for diversification and improvement of global agriculture. This activity has an inherent risk of introducing exotic plant pathogens (virus, fungi, bacteria, phytoplasma and other disease causing microbes), weeds, insects and nematodes that could result in damaging economic losses. Pests and diseases associated with the germplasm may reduce longevity of germplasm during storage and have negative effect on crop performance. International exchange of cassava and yam germplasm is mainly through sterile, virus-indexed in vitro plantlets and botanical seeds. Domestic distribution involves exchange of vegetative propagules (setts and mini-tubers of yams and stem cuttings of cassava). Safeguards established at IITA to prevent spread of pests and diseases from one area to another area through cassava and yam germplasm will be presented.

Key words: Safe exchange, cassava, yam germplasm

Distribution and severity of Taro leaf blight in different agroecological zones of Nigeria

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Abstract

Taro leaf blight (TLB) caused by *Phytophthora* ***colocasiae is the most important disease of taro (Colocasia esculenta) globally. The disease was first reported in Nigeria in 2009 and is becoming a major concern to taro production in the country as well as neighboring countries of Cameroon and Ghana. Following the outbreak in Nigeria, a georeferenced survey was conducted in 2011 to establish the distribution and severity of TLB in farmers field across three major taro producing agro ecological zones of Nigeria.*** In addition, the possible presence of resistant cultivars in farmers' gene pool was assessed. The survey was conducted in four states in Humid Forest (HF), two in Derived Savanna (DS) and two in Northern Guinea Savanna (NGS) ecological zones.
TLB was generally prevalent across all the ecological zones with field incidence (% of plant stands with TLB symptoms) ranging from 30 - 100% in DS zone, 0 – 100% in HF zone and 40 – 100% in NGS zone. Similarly, disease severity as indicated by percentage plant area affected varied across the ecological zones, but was generally high with mean scores of 41.9% in DS, 40.9% in HF and 37.3% in NGS. In all the states visited, the farmers noted that the disease was unknown to them until **2009/2010 cropping season**. Also the farmers generally observed that they do not know of any resistant local cultivar. This study highlights the need for targeted effort towards securing the vulnerable landraces and diversifying existing genepool through introduction.

Key word: Leaf blight, distribution, ecological zone, severity, survey, Taro

CGIAR Research Program (CRP) on Roots, Tubers, and Bananas: rationale, strategy and impact

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Abstract

The CRP recognizes that research must embrace a broad portfolio of commodities beyond the grain crops that have traditionally been the focus of food security initiatives. **Roots, tubers, and cooking bananas and plantains** are a critical component of the global food system. As vegetatively propagated crops they have many similarities for genetic conservation, breeding strategies, seed systems and post-harvest technology. The program is led by the International Potato Center, Bioversity International, the International Center for Tropical Agriculture, and the International Institute for Tropical Agriculture and includes a wide spectrum of research-for-development stakeholders. This new collaboration, with its combined scale and capacity, will increase the ability to advance research, share knowledge, and enhance impact.
The program strategy is to exploit the underutilized potential of root, tuber, and banana crops to reduce the risk of food shortages and malnutrition through increased yields and stronger, more diversified crop systems. In addition, the CRP aims to increase income generation and foster greater gender equity. The CRP has identified impact pathways to increase the likelihood that research is translated into improved livelihoods – especially among some of the world's most poor and vulnerable populations. In its first year of operation, it is quantifying potential impacts to help priority setting. Engaging partners and stakeholders will be critical to successful implementation.

Key words: Planning, cassava, plantains, potatoes, sweetpotato, yams

A strategy for Defining Research Priorities for Roots, Tubers and Bananas

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Abstract

The resources available for implementing the CGIAR Research Program Roots, Tubers, and Bananas (CRP-RTB) are limited and have an opportunity cost in terms of foregone alternatives. This determines the need to prioritize investments through the identification of those research options which can be expected to yield the highest impacts on welfare, poverty, food security, human nutrition and health, gender equity and environmental sustainability. Aimed at the strategic definition of research priorities, the CRP-RTB will pilot a systematic approach to revising and updating its research priorities. The objectives of this paper are to present this approach and to engage scientists and stakeholders from the cassava community in a dialogue about this strategy. The approach taken uses a six stage research process. The first stage is a background analysis of crop ecologies and magnitude of the yield gaps. The second stage consists of the analysis of key constraints to crop production. In a third stage, alternative research options to address these constraints are analyzed. The fourth stage is the estimation of different measures of expected impacts. In a fifth stage, focal point studies of local context are carried out. In a final stage, results are communicated to stakeholders and the general public. The approach ensures that the strategic definition of CRP-RTB priorities incorporates the views of the stakeholders in the global research community.

Key words: Priority setting, cassava, plantains, potatoes, sweetpotato

Conserving and Accessing Genetic Resources of Roots, Tubers and Bananas (RTB)

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Abstract

Four CGIAR Centers -- Bioversity, CIAT, CIP and IITA -- work together and with regional and national partners to develop and implement global research strategies for RTB germplasm conservation and access to the existing diversity for users. This first theme, among seven of this CGIAR Research Programme (CRP 3.4) will include research activities related to collection, introduction, ex- and in-situ conservation, characterization (morphological and molecular), and evaluation of germplasm. Specifically, Theme 1 will focus on the improvement of conservation methodologies and the development of tools to define gaps in collections and increasing coverage of gene pools. The programme will analyze the genetic diversity structure of collections and evaluate them for traits of interest. It will enhance access to germplasm and related information through the improvement of databases and the implementation of pathogen eradication methods that guarantee safe exchange of RTB genetic resources. Research on in-situ conservation in centers of crop origin and diversity will be also attended by some of the centers.
Partners will be fully engaged in all phases of these activities. This includes the development of technologies that will ensure, in perpetuity, conservation and safe movement of the entire RTB gene pools and use of germplasm worldwide. The next users of this theme are mainly genebank curators, breeders and farmers among other stakeholders.
Key products generated by Theme 1 will include (i) germplasm, mainly as virus-free plantlets, but also as seeds, of diverse germplasm (wild species, landraces, cultivars, improved material) that will be available for use by RTB breeders to conduct improvement of cultivars in the best conditions, (ii) medium and long ter storage media, (iii) knowledge about genetic gaps and diversity structure (first selected cross RTB crops cutting area), (iv) in-situ conservation strategies, among others. The challenge is to build efficient partnerships across centers and with national actors to reach the end-users, the farmers. A first cross crop collaborative project is being put in place: Explore Global RTB diversity through Next Generation Sequencing.

Key words: Genetic Resources, cassava, banana, plantain, potato, sweet potato, yam

Accelerating the development and selection of varieties (Theme 2)

Becerra, Augusto

Research for the development of sustainable management options of pests and diseases of roots, tubers and banana crops (Theme 3).

Hanna, Rachid

Making available low-cost, high-quality planting material for farmers – searching for opportunities to improve seed systems (Theme 4)

Ortiz, Oscar

Developing tools for more productive, ecologically robust cropping systems; an example cutting across crops (Theme 5)

Hauser, Stefan

Improving post harvest qualities and expanding utilization (Theme 6)

Dufour, Dominique

Communications for impact (Theme 7)

Inge van den Bergh

Priority setting: best bets stakeholder survey

Guy Hareau

Yam Improvement for Income and Food Security in West Africa (YIIFSWA)

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Abstract

The project YIIFSWA has been designed to impact on food and income security through a research for development intervention, involving value chain stakeholders through an integrated approach at the formulation phase and subsequent implementation. Responsibilities were shared among specialised partner institutions for: a) improving access to high quality seed, b) improving productivity of ware yam cultivation, c) scaling out yam production technologies, d) reduction of post-harvest losses, e) strengthening and empowering small-scale farmer organizations, and f) improving their linkages with traders. Private sector involvement and development of seed systems commercialization will be especially important to support small-holder adoption of innovations. The project will benefit various yam actors along the value chain including farmers (seed yam and ware yam producers); wholesalers and retailers of seed yam and fresh ware yam; specialised ware yam processors and processed product traders; transporters who link production sites with markets; yam exporters; yam food sellers; urban consumers etc. The overall goal of YIIFSWA is: (a) in the next five years increase yam productivity (yield and net output) by 40% of 200,000 smallholder yam farmers (90% with less than 2 acres) in Ghana and Nigeria; and (b) deliver key global good research products that will contribute to the 10-year overall vision to sustainably double incomes from yams for 3 million small-holder yam farming families in West Africa, and contribute to ensuring food security for producers and consumers.

Key words: Yam improvement, income, food security

Value Chain Analysis of the Yam Sectors in Ghana and Nigeria

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Abstract

Value chain analyses (VCA) form a major component of the Yam Improvement for Incomes and Food Security in West Africa (YIIFSWA) project, which is being implemented by IITA in partnership with national and international organisations in both Ghana and Nigeria. In addition to preliminary, rapid VCAs, more in-depth analyses are being carried out in both countries to improve understanding of value chains for ware, seed, and processed yam.

The findings of the preliminary studies, which included mapping of the principal supply chains for major urban consumption areas,confirm that the domestic markets for fresh yam are the principal outlets for the tubers in both Ghana and Nigeria. Nonetheless, there are also variations between the two countries in that Ghana has been able to establish strong export markets (overseas and within the region), whilst in Nigeria there are more processed products available, including both traditional,dried products,and products that have more recently entered the market such as well-packaged *poundo* yam and yam flour.

In addition to output markets, the project has a strong focus on the seed marketing system. Whilst in many parts of West Africa farmers mainly rely on locally available seed yam, there are locations where specialised seed markets have been established (e.g., Edo State in Nigeria). In particular, the distribution of improved seed yam through commercial channels is one of the centrepieces of the YIIFSWA project.The article describes how value chain analysis is used to enhance the efficiency of both seed and output markets and form a basis for implementing yam farmer and market development programmes. .

Key words: Yam, YIIFSWA, Poundo, value chain analsis

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Baseline Survey Protocols: The Case of YIIFSWA Project in Ghana and Nigeria

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Abstract

Despite its importance in the economy and lives of many people, yam faces a number of constraints that significantly reduce its potential to support rural development and meet consumers' needs as an affordable nutritional product. The Yam Improvement for Income and Food Security in West Africa (YIIFSWA) project is seeking to address these prioritised constraints which have therefore formed the basis for its interventions. The project covers mainly Ghana and Nigeria, and adopts a holistic and sustainable approach in which technology development is grounded in a partnership between researchers, service providers and supporting organizations, private sector, farmers and traders.In order to: a) understand the production systems; b) identify yam varieties being grown and farmers' preferences; c) determine constraints and opportunities; d) establish pest and disease incidence and severity on yam; e) test farmers' knowledge and understanding of yam in various aspects such as production, storage, processing, utilization, and marketing and; f) assess yield levels; a baseline study was therefore conducted following protocols developed by International Institute of Tropical Agriculture (IITA). Baseline Survey Protocol is a quantitative survey methodology developed in order to conduct livelihood study of smallholder farmers in yam growing areas. To provide baseline indicators against which the progress of future interventions could be objectively measured, the baseline study proposes the use of questionnaire and focus group discussions. Livelihoods assessment aims at gaining an understanding of the significance of the project to the livelihoods of project participants and their surroundings. Such an assessment is based on the premise that the project and project participants shared a core aim: the enhancement of local people's livelihoods.
The findings can be used to inform the development of complex interventions targeted at structural, socio-economic factors, intended to enhance food security and reduce poverty.

Key words: Baseline protocol survey, yam, Ghana, Nigeria

Virus and Virus-like Diseases of Yams in West Africa: Status and Prospects for Control

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Abstract

Virus diseases constrain production of yams (*Dioscorea* spp.) in West Africa, affecting the yields of ware tubers, quality and health of seed yams as well as impeding the international exchange of germplasm. The most important viruses in West Africa are *Yam mosaic virus*, *Yam mild mosaic virus*, *Cucumber mosaic virus* and several badnaviruses (e.g. *Dioscorea alata bacilliform virus* and *Dioscorea sansibarensis bacilliform virus*). Some badnavirus sequences have been found to be integrated in several yam genomes. In addition, a virus-like disease termed yam internal brown spot disease (YIBSD) that causes dry corky tuber necrosis was found in Côte d'Ivoire. Virus disease incidence in West Africa is high (50 to 80%) due to vegetative propagation of yams using tubers (seed yams or setts) that contributes to the accumulation and perpetuation of tuber-borne viruses. In view of the threat viruses pose to ware and seed yam production, a new collaborative program has been initiated as part of the 'Yam Improvement for Income and Food Security in West Africa (YIIFSWA)' initiative. The objective of this program is to determine the virus diversity and distribution of the variants in Nigeria and Ghana, and use this knowledge to develop robust diagnostics for virus indexing, production of clean seed yams and phenotyping yam germplasm for resistant sources. This program will also estimate the rate of reinfection and type of deterioration of clean seed yams, knowledge of which is vital to determine the seed yam replacement rate. This paper describes state of knowledge on yam viruses in West Africa and findings under the YIIFSWA program.

Key words: Virus, virus-like diseases of yams, West Africa, status and prospects for control

Facilitating clean seed yam entrepreneurship in the Niger River system.

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Abstract

This paper explores the results of a DFID Research into Use programme designed to facilitate entrepreneurship centred on clean seed yam (*Dioscorea rotunadata*) production on the eastern bank of the River Niger. Ware yam farmers residing along the eastern bank of the Niger, just below the confluence with the Benue River, source their planting material from towns such as Ilushi, Edo State. This involves significant travel and expense. The RIU project sought to encourage ten ware yam growers in the village of Edeke (Idah Local Government, Kogi State) to specialise in clean seed yam production by employing the Adapted Yam Minisett Technique (AYMT). The AYMT employs a sett size of around 80 - 100 g and a treatment using an insecticide and fungicide dip. The treated setts are dried and planted directly into the field rather than employ a nursery as with the Yam Minisett Technique. The Edeke farmers received a loan from the Diocesan Development Services (DDS) to employ the AYMT to grow clean seed yams on a significant scale. However, while sales of seed yam by four of the farmers generated a significant and positive gross margin, the majority of them opted to plant the seed yams in 2012 to produce ware yams for repaying the load. The paper presents some of the results and discusses the balancing undertaken by the farmers between seed and ware yam and the possibility of developing new markets for seed yam in the Idah area.

Key words: Clean seed yam, entrepreneurship, Kogi State, Nigeria

Evaluation of the yield and consumer preferences of some yam cultivars selected for export

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Abstract

NRCRI Umudike and IITA Ibadan were invited to provide research leadership in selecting the best yam cultivars for export based on selected criteria by the Standards Organization of Nigeria (SON). **NRCRI and Nasarawa State through their AgroExport Project (ADP) conducted on-farm trial in 2008 and 2009 to identify and select cultivars with** high and stable yield, acceptable tuber shape and consumer qualities as specified by the importing authorities. The objective was to select a number of yam genotypes that could be recommended to farmers specifically to target European markets. **Seven most valued landraces and 5 improved yam varieties were evaluated on-farm among farmers in each of the three ADP zones of Nasarawa State.**
Aloshi was the highest yielder both in 2008 and 2009 followed by Amola. Pepa had a setback in 2008 because of poor quality of seed yams planted but in 2009, it was as good as Aloshi. Among the released varieties from Umudike, only TDr 89/02565, TDr 95/19158 and TDr 89/02475 were most promising. It is noteworthy that the control (Obioturugo) was as good as all the other cultivars except Aloshi and Amola. Contrary to popular opinion, some yam cultivars from the south would perform very well in the North and vice versa.
Based on our preliminary assessment, most promising cultivars in terms of yield and consumer preferences are: Pepa>Aloshi>Amola>Hembamkwase>TDr 89/02565>TDr 89/02475>Obioturugo. *Miracle yam* (TDr 02665) did not perform as expected due probably to poor seed yams used. The only setback on TDr 95/19158 is that browning of cut surface was observed. We were yet to confirm if this was locational effect.

Key words: Evaluation, yield and consumer preferences, yam cultivars, Export

Diversity Study on Yam Genetic Resources in the "EDITS-Yam" project

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Abstract

JIRCAS is implementing the project "Evaluation and Utilization of Diverse Genetic Materials in Tropical Field Crops (EDITS)" on several tropical field crops to accelerate the utilization of diverse genetic resources for developing breeding materials. Yam is one of the target crops of the EDITS. EDITS-Yam, the on-going JIRCAS/IITA/IBRC collaborative project on the "Use of genomic information and molecular tools for yam germplasm utilization and improvement for West Africa", is aiming for developing and utilizing genomic and molecular tools for the utilization of yam germplasm to improve productivity of yam in West Africa. As a part of this project, we set out to implement genetic diversity studies for better management and utilization of the West African yam genetic resources.

IITA maintains over 3,000 yam accessions, and established the Yam Core Collection consisting of around 10% of the whole collection based on morphological variations. Regarding to this collection, genetic and phylogenetic information is still meager. Further systematic evaluation and analysis of agronomic traits and genetic variations are required to utilize these genetic resources for breeding. To develop efficient evaluation system for genetic diversity of yam germplasm, we have started this collaborative study by selecting a "sub-core" set i.e. Yam Diversity Research Set (YDRS), consisting of smaller sample size (easy-handling) but conserve diversity at same level as the original population. YDRS is being selected from the IITA Core Collection by using DNA polymorphisms and utilized to accelerate further analysis of genetic background and features of the West African yam germplasm in relation to useful agronomic traits. The DNA markers for this study are being developed by IBRC which is generating the first Guinea yam genome draft sequence in the same project, EDITS-Yam. We believe that the further evaluation of genetic features of the genetic resources based on agronomic traits and molecular diversity will pave a road to establish good evaluation systems of yam genetic resources for good management and active utilization not only for the region but for global yam research and breeding networks.

Key words: Yam, genetic resources, diversity, core collection, Diversity Research Set, DNA polymorphisms

Identification of EST-SSR and SNP markers for Linkage Mapping in *Dioscorea alata* L.

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Abstract

Yam (*Dioscorea* spp.), a multi-specie, polyploid and vegetatively propagated crop, is an economically important and key starch crop in Africa, feeding over 300 million people, in the tropical regions. Its production is equivalent in scale to cassava. However, with as many as ten species under cultivation, all aspects of breeding and crop improvement are more complex than for other crops. Presently, there are few genetic resources, and no mapped genetic markers that can be applied to breeding for any specie of yam.

Over years, very few molecular markers were available in *Dioscorea*, and several of these show cross species incompatibility limiting their use across different species and genetic analysis of traits of economic importance for further marker-assisted selection in yams. In this prospect, 1152 EST-SSRs were identified from about 40,000 EST sequences of *D. alata*, and a F1 mapping population derived from TDa 95/00328 X TDa 95-310, mainly targeting anthracnose disease, was developed. The EST-SSRs were tested for polymorphism on the parental DNA, of which 92 did not amplify and 530 were monomorphic. A total of 452 SSRs produced a single product (one allele), 70 with two products (possible indication of duplicated genome) and eight multi-allelic indicating the polyploidy nature of the crop. Based on quality and allelic pattern, 388 SSRs were identified as polymorphic, of which 123 were of high quality and were used to genotype the mapping population progenies consisting 94 individuals.

For anthracnose screening, a total of six *Dioscorea* genotypes showing variability for anthracnose resistance, including mapping population parents, were inoculated with 41 diverse pathotypes of *Colletotrichum gloeosporioides* (causal agent of anthracnose) to identify most virulent pathotype. Three most virulent pathotypes were selected for further screening on mapping population progenies for phenotyping the mapping population progenies. The experiment was carried out in screen house using vine-cutting technique that involved inoculation of whole vine of the yam seedlings. The disease severity was scored on a scale of 1 to 5, where 1: least severe infection, and 5: most severe infection. The genotyping and phenotyping data will be used for linkage mapping and identifying QTL (s) for anthracnose in *D. alata.*

Key words: *Dioscorea. alata*, expressed Sequence Tags – Simple Sequence Repeats (EST-SSRs), single Nucleotide Polymorphisms (SNPs), anthracnose, virulent pathotypes

Private Sector led Strategy for Development Yam Industry and Associated Farming Systems in Ghana

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Abstract

Sector strategy development for yam has not been implemented in Africa. Setting priorities to overcome yam production and commercialization constraints has mainly been done through consultative tools and focused on biophysical constraints, and stakeholders different of scientist and extension officers have usually not being involved. The overall objective of the strategy and implementation is to improve the livelihoods of the farming communities through a market led approach that holistically considers economic & social issues together with crosscutting and enabling factors. The work will include other crops in the farming system as well as processed foods for domestic market and export. This process has been used by ITC ad IITA in more than 50 sectors and 40 countries. A combination of different studies such as markets, production systems, gender, etc along with participatory workshops involving all the stakeholders of the yam value chain will provide knowledge to make decision and formulate the strategy. It will result in detailed implementation plans that reflect buyer and producer community priorities at national and sub-regional levels. The strategy for development seeks to align itself and consider all existing policy frameworks, Government led projects, management frameworks and existing development plans. Government, IITA and ITC will facilitate the process and provide technical and financial inputs. The process will seek for partnerships and will involve several Ministries as well as donor agencies and representatives from buying countries and the domestic value chain. The strategy fosters partnerships among all actors and development partners so that existing and new resources and skills can be maximized. The strategy takes a systemic view and pays great attention to catering for the view point and priorities of different types of farmers (small holder community based, independent, and commercial) with different types of interests and decision making models. This private sector led platform is expected to continue to represent the sector and strategy for as long as necessary. The strategy therefore allows for the strengthening of a network or link with the value chain ACTORS as a whole in order to ensure effective implementation and alignment of interventions and support facilitated by existing Government Committees

Key words: Yam, value chain, strategy development, private sector led

Increasing Productivity and Utilization of Food Yams in Africa (IPUFYA)

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Abstract

The rate of increase in yam production in West Africa has been slowing. It is predicted that yam production could decrease dramatically over the next 15 years unless urgent steps are taken to reverse the decline, which has been attributed to factors such as deteriorating soil structure and fertility associated with shortening fallow periods. Efforts to overcome these problems have been oriented to develop high yielding varieties with minimal attempts to face the decreasing soil fertility constraints. The objective of this project is to increase ware yam productivity through generation, validation and scaling up and out of Integrated Soil Fertility Management (ISFM) interventions to meet the needs arising from decreasing soil fertility caused by continued soil cultivation without nutrient and organic matter replenishment in the region. Through participatory approaches, innovative research approaches combining the improved soil fertility management intervention and selection of nutrient use efficient yam varieties as strategies to design ISFM for sustainable yam production. The best promising ISFM packages identified and selected will be tested and scaled up on farm Pilot Demonstration Plots (PDP) on farmer fields in collaboration with other stakeholders The expected increase in yam production in West Africa will contribute in three scenarios as follows: a) improving food security reducing risk of food crises and reducing risk of emigration processes from West Africa. b) Improving income generation for West African farmers, allowing them to improve livelihood and human development, enhancing capacity to diversify acquisition and purchasing power, buying more commodities and other products. c) food security of Japanese society could indirectly benefit by increasing the possibility of using yam from West Africa in many food preparations of high consumption in Japan, such as noodles, flours, starches etc;. **The expected impact of the project are t**uber yield increases of 30-50% **over the current yield (10 t/ha) by** directly involved farmers and of 20-30% by indirectly involved farmers around **10 years after the start of the project. Yield increase will be feasible through the combination of improved varieties with tolerance/resistance to anthracnose, viruses and efficient N and K uptake on soils with improved fertility and quality.**

Key words: Yam, integrated Soil Fertility Management, soil fertility, articipatory Research, nutrient use efficient varieties.

Organic soil amendments in nematode management in yam production

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Abstract

The potentials of organic soil amendments (OSA) to control plant parasitic nematodes (PPN) infection in yam production was conducted at Ejura in the Ashanti region of Ghana during 2010 and 2011. Five treatments comprising three OSA; neem seed powder, cocoa bean testa powder and *Mucuna pruriens* seed powder, Fulan (a synthetic nematicide + insecticide) and a control were replicated five times in a randomized complete block design involving one variety of yam, Leelee. Nematode population density / 200 cm^3 soil at harvest, nematode density / 5 g yam peel and yield were analyzed.

Four PPN; *Meloidogyne* spp., *Pratylenchus coffeae*, *Scutellonema bradys* and *Rotylenchulus reniformis* were identified associated with yam rhizosphere soil. The control treatment recorded significantly ($P < 0.05$) high population densities (346, 508, 305 and 261) / 200 cm^3 soil respectively. *M. pruriens* however recorded (133,128, 88 and 74)/ 200 cm^3 respectively which represented significant reduction of (62, 75, 71, and 72 %). *M. pruriens* treatment was not different from Fulan (115, 136, 92 and 91) respectively which represented reduction of (67, 73, 70 and 65 %). The three nematodes recovered from the peels of yam; *Meloidogyne* spp., *P. coffeae*, and *S. bradys* followed similar trend.

M. pruriens treatment yielded the highest 20.3 t/ha whilst the control yielded the lowest 8.7 t/ha. *M. pruriens* treatment out-yielded the control by 57 %. Erratic rainfall might be responsible for the very low yields. The use of OSA for pest management is ecologically acceptable.

Keywords: *Dioscorea rotundata*, Ghana, nematodes, organic soil amendments.

Productivity Estimate of the yield of Yam (*D. rotundata*) Minitubers originated from Vine cuttings

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Abstract

The objective of this study was to estimate the potential of minitubers derived from vine cutting seedlings for sprouting and yield for seed yam tuber (SYT) production. The performance of four categories of minitubers of 0-5g, 6-10g, 11-15g, 16-20g with 25-30g minisett as control were evaluated for rate of sprouting in percent and yield. This experiment was conducted at IITA- Ibadan in 2011. Randomized complete Block Design with three replications was used. Each of the factors considered had 30 stands per replication. Results show that the minitubers sprout was significantly different at 14DAP resulting in a significant yield and maturity difference as observed at 90DAP. The minitubers sprouted two weeks earlier than the minisett. The study further shows that the rate of sprouting, shoot and tuber weight has positive correlation and increases with minitubers weight. There was no significant different in the sprout performance of the factors at 49DAP. On the yield side, 16-20g minitubers were significantly higher in sprouting rate, shoot and tuber yield. There was no significant difference in the yield of minitubers of 11g and above and minisett while the minitubers below 11g were significantly lower than the minisett of 25-30g. Even though, significant differences were not observed among the minitubers of 11g and above and the minisett, the mean tuber yield obtained among them suggested that minitubers obtained from vine seedling with weight as low as 5g is suitable for SYT production and can be classified as primary seed tuber (PST) while minitubers of 11g could be used to replace minisett thereby saving 560 kg of tuber as planting material per hectare. 11g and above minitubers are potential ware yam production propagules under good management practices and suitable environmental conditions.

Key words: Vine cuttings, minituber, minisett, seed yam tuber

Review of global nutrition studies: Implications for dissemination of Vitamin A cassava

Boye, E. and Maziya-Dixon, B.

Status and micronutrient deficiency in children under 5 and women of child bearing age who consume cassava as a staple in Akwa Ibom State

Maziya-Dixon, B

Breeding for more nutritious cassava: The past, present and future

Kulakow, P.; Parkes, E.; Egesi, C.; Ceballos, H.

Table properties of Vitamin A gari: A consumer acceptance perspective

Oparinde, A. and Birol, E.

Vitamin A cassava in Nigeria: The challenge of sustaining adoption

Ilona, P.

Progress in breeding for high beta-carotene cassava in Democratic Republic of Congo

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Abstract

Cassava (*Manihot esculenta* Crantz) commonly grown for its tuberous roots constitutes a very important source of food carbohydrates in Democratic Republic of Congo (DRC). When much improvement of this crop mainly focused on agronomic or economic traits such as tuberous root yield and dry matter for food security and industry demand, breeding activities aiming at selection of yellow fleshed cassava genotypes are also being carried out for nutrition value enhancement, principally in beta-carotene (provitamin A). These works resulted in development of four yellow flesh cassava varieties having total carotene content (TCC) of 2.78, 3.83, 4.37 and 9.41 µg/g that were released in 2008 and registered in National catalogue. Considering the content of 10 µg/g as selection target for vitamin A, only variety I 01/16161 with 9.41 µg/g could be finally recommended to farmers for large scale multiplication and dissemination.

A number of crossings between locally-produced varieties and introductions of new seeds were made to diversify germplasm and increase potential in provitamin A content of yellow flesh materials in the country. Hundred and eighty-three (183) yellow flesh root seedlings identified in seedling nursery were cloned and moved in 2010-2011 clonal evaluation trial (CET) at Mvuazi station, Bas-Congo. Determination of TCC using iCheck allowed the selection of 12 CMD-resistant genotypes with good tuberous yield and acceptable dry matter content and TCC ranging from 6.09 to 9.5 µg/g. These genotypes promoted in preliminary yield trial are undergoing normal selection process.

Keywords: Cassava, improvement, beta-carotene

Prevalence of *Alternaria* Bof Sweetpotato in Uganda

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Abstract

A field survey of sweetpotato *Alternaria* blight disease was carried out in 17 districts of Uganda between January and April 2007; a total of 292 *Alternaria* samples were collected. Severity of *Alternaria* on sweetpotato in the farms was scored on a scale of 1 to 5; where 1 = no symptoms and 5 = severe damage. The severity of the disease was rated as high, medium and low respectively among the farms. **The highest severity index of the *disease* was observed in Wakiso district (52.9 %) followed by Mpigi (51.6%). Moderate disease incidences were recorded in Masaka (45.2 %), Kamuli(44.2%) and Rakai (42.2%), and the lowest disease incidence was recorded in Kibale (24.6 %), Sironko (24.9%) and Ntungamo (26.1%). In general, there was a high severity score during the peak cropping season especially in the central and eastern region ranging from 3 – 5. However, no significant differences were recorded on occurrences of *Alternaria* among districts.** The difference in disease incidence between districts was **partly attributed to the cropping pattern differences at the time of the survey. Most of the sweetpotato fields in Kabale were about 2 months old; at this stage the plants rarely show *Alternaria* symptoms.**

Key words: DNA fingerprinting, A. alternata and A.batatitcola

Determining the Pan-African Sweetpotato virome: Understanding Virus Diversity, Distribution and Evolution and their Impacts on Sweetpotato production in Africa

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Abstract

Food security remains a huge challenge for the millions of Africans dependent on agriculture for their subsistence. A low-level agricultural productivity and a high percentage of poor and undernourished people are common in Africa, particularly in sub-Saharan Africa (SSA). Sweetpotato, *Ipomoea batatas* (L.) Lam. (Family *Convolvulaceae*), is among the most important food crops in the world and an extremely important food crop for subsistence farmers in SSA. It is grown throughout the African continent and currently around 34.5% of global sweetpotato area is in Africa. SSA produces approximately 7 million tons of sweetpotato annually, only about 5% of global production. One major limitation in sweetpotato production is cultivar decline, mostly due to the cumulative effect of virus infection on this vegetatively propagated crop. Thus, viral diseases are considered a major limiting factor in sweetpotato production worldwide, and particularly in SSA. However, there is a widespread lack of basic information and understanding of virus populations throughout Africa, even though such basic information is required to manage the spread and impact of these viral diseases. This project will focus on evaluating a novel approach, deep sequencing and assembly of small RNAs from field-grown sweetpotato samples collected throughout Africa, to systematically and efficiently identify virus genome. A Pan-African sweetpotato virome will be established, which will provide the scientific community and government unprecedented possibilities to understand sweetpotato virus distribution in Africa, guide phytosanitory requirements, predict risks of future epidemics, and suggest regional disease management strategies. In West-Africa the survey is expanded to include Cassava, Banana, Yams and Potato.

Key words: Pan-African sweetpotato virome, virus diversity, distribution, evolution, impacts, sweetpotato production

Effect of Whole Cassava meal on the Performance, Carcass weight and Nutrient digestibility of Broilers

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Abstract
An eight week feeding trial was conducted to investigate the effect of replacing maize with whole cassava meal (WCM) on the performance, organ weights and nutrient digestibility of broilers.
Five diets were formulated, I being the control and II III IV and V had their maize content replaced at graded levels of 25%, 50%, 75% and 100 % with WCM.250 day old Anak broiler chicks were randomly assigned to the five experimental diets.
Results revealed broilers on diet I-III had similar weight gain and feed intake higher than IV and V. Feed conversion efficiency of the broilers also had a similar trend. Digestibility in broilers decreased as the inclusion level of WCM increased, this depressed weight gain and feed efficiency. Mortality between 2.5 to 10 % were recorded which cut across the diet and it was not dietary related.
Dressed weight, thigh weight, breast weight and drum stick weight had the same statistical trend as feed intake and weight gain. Broilers on diets I-IV had similar result (P= 0.05) while those on diet V was lowered (P<0.05) than others.
In conclusion WCM can replace maize in diets of broilers up to 50% without adversely affecting the performance characteristics organ weights and nutrient digestibility

Key words: Whole cassava meal, broilers performance nutrient digestibility

Some Selected Minor Root and Tuber Crops in Nigeria: Their Biochemical Composition and Potential Contributions to the Nutrition and Economy of the Rural Households.

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Abstract

In Sub-Saharan Africa, Root and Tuber (R&T) crops occupy a remarkable position in the food security as major source of sustenance. Although they are reputable for high production of calories and carbohydrates; many serve as good source of vitamins, minerals, and essential amino acids. R& T are found to be endeared to the farm households not only because they produce large quantities of dietary energy per day but they also maintain relatively stable yields under conditions in which other crops may fail on one hand and their adaptability to the traditional farming systems on the other. They are often grouped together because they are bulky, perishable, and vegetatively propagated; however, they are found to be highly differentiated in terms of origin, production and nutritional qualities. Some of them are already domesticated but others are grown as neglected group of economic plants or collected in the wild and are commonly tagged "minor, underutilized or orphan" root and tuber crops. Among the "minor" root and tuber crops currently receiving research attention at the National Root Crops Research Institute (NRCRI) Umudike, Nigeria in the last decade are, Turmeric (*Curcuma longa*Lim), Polynesian arrowroot (*Taccaleontopetaloides*Kuntze), Livingstone potato (*Plectranthusesculenta*N.E. Br) and Hausa, Sudan, Frafra or Coleus Potato (*Solenostemonrotundifolius*Poir). Many of these crops assume different local names depending on the locality and have multipurpose uses ranging from starch staples, medicinal, income generation and preservation of customs and cultural identity. In spite of their economic importance, active and directed research on "minor" roots and tubers started a little over a decade ago The exploration studies carried out in conjunction with IITA, Ibadan between 2004 and 2006 with a view to collecting some baseline data in the 36 states in Nigeria mark the beginning of an active and directed research effort. The results of the exploration study and biochemical analyses carried out on samples collected form the major thrust of this write up.

Key words: Minor roots and tubers, nutrition, Nigeria

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Nutritional Evaluation of Vines (Leaves and Stems) of Selected Sweet Potato (*Ipomoea batatas*) Varieties and Potential Uses in Cameroon

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Abstract

This study aimed at evaluating the nutritional content of the leaves and stems of some exotic and local varieties of *Ipomoea batatas* and how the young vines can be used for cooking *Gnetum Africana* sauce. Nutrient levels of the both leaves and stems were determined by the use of standard analytical procedures. The dry matter were 16.23 g/100g and 17.02 g/100g in the young leaves of the exotic and local varieties respectively while 12.88 g/100g and 18.35 g/100g recorded for the young stems of the exotic and local varieties respectively. Crude Protein contents were; 17.49 g/100g and 24.70 g/100g (DWB) in the young leaves of the exotic and local varieties respectively while 8.79 g/100g and 11.26 g/100g (DWB) were recorded for the stems of the exotic and local varieties respectively. Ash contents were; 12.91 g/100g and 10.46 g/100g in the young leaves of the exotic and local varieties respectively while, 15.88 g/100g and 7.70 g/100g (DWB) were recorded for the stems of the exotic and local varieties respectively. Crude fibre levels were 22.23 g/ 100g and 19.45 g/100g (DWB) in the young leaves of exotic and local varieties respectively. Carbohydrates levels were; 38.40 g/100g and 41.25 g/100g (DWB) in the young leaves of the exotic and local varieties respectively. The fat contents were 2.86 g/100g and 2.49 g/100g in the young leaves of the exotic and local varieties respectively. Retinol contents were 904.40 IU/100g and 1105.09 IU/100g (FWB) in the young leaves of the exotic and local varieties respectively. The vines of sweet potato could soften *Gnetum africanum* giving a sauce with acceptable colour, texture, favour and taste. This study also revealed that the crude protein and total carbohydrate contents of the local varieties were significantly ($P<0.05$) higher than those of the exotic varieties.

Key words: Nutritional profile, sweet potato vine, local varieties, exotic varieties, potential uses

Reaching out to the Disadvantaged with Orange Fleshed Sweetpotato: Reach out Nkokonjeru Parish Hiv/Aids Initiative

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Abstract

Buikwe District of Uganda is much affected by the deadly HIV pandemic; more than 65% of the population is affected. Most of the people in this area are therefore at a high risk of Vitamin A Deficiency (VAD) and mortality and are often food and income insecure. Because HIV/AIDS exacerbates malnutrition, Orange fleshed Sweet potatoes (OFSP) are being promoted in Buikwe District through the Reach out Nkokonjeru Parish HIV/AIDS Initiative to mitigate the situation of persons living with HIV/AIDS. The initiative was based on earlier positive impacts of OFSP interventions in neighboring districts by HarvestPlus where it was reported that OFSP boosted immunity of HIV/AIDS orphaned children. Limited quantities of planting materials were sourced from the National Crops Resources Institute (NaCRRI). With the help of technical expertise from NaCRRI, HIV affected households were trained in good practices for sweet potato production and utilization. The seed was multiplied by the primary beneficiaries and re-distributed to secondary beneficiaries. To date, more than 350 households have benefitted from this initiative.

Key words: Reaching out, disadvantaged, orange fleshed sweetpotato

Are Enzymes involved in degrading -carotene during Storage of dried Sweet potato (Ipomea batata Lam)

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Abstract:

Orange-fleshed sweet potato (OFSP) could help tackle vitamin A deficiency in developing countries where sweet potato is a main subsidence crop. However it has been demonstrated that degradation of β-carotene was an important issue during the storage of dried OFSP. One of the causes of carotenoid degradation during storage could be enzymatic activity. The aim of the study was to find out whether the degradation of β-carotene in dried sweet potato resulted mainly from enzymatic activity or autoxidation.

In the first place, a simplified model system consisting of a β-carotene standard dissolved in buffer medium at pH 6.0 and pH 7.4 at 40ºC was tested for β-carotene catabolism by enzymes including commercial horseradish peroxidase and soybean lipoxygenase and by autoxidation using H_2O_2 and linoleic acid. In the presence of 2,4 dichlorophenol (free radical generator) and hydrogen peroxide, bleaching of -carotene by horseradish peroxidase was instantaneous, and showed that peroxidases could have a strong influence on carotenoid oxidation. Although -carotene autoxidation was slower than enzymatic oxidation, it was also significant ($p<0.05$) in the presence of linoleic acid.

In a second place, enzymatic (peroxidase and lipoxygenase) activities were determined after drying and storage of sweet potato and at different water activities. It was shown that peroxidase activity of dried sweet potato strongly declined with storage (19; 54 days) and with decrease in water activity (aw=0.7-1.0). The study concluded that although commercial peroxidase was able to degrade -carotene in a liquid medium, the conditions encountered in the sweet potato (low water activity and decrease of enzymatic activity during storage) suggested that degradation of -carotene in dried sweet potato is more likely to result from autoxidation rather than from enzymatic activity.

Key words: *Ipomoea batatas* (L.) Lam, Peroxidase, -carotene loss, cleavage activity.

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Physicochemical Characterization of Selected White yam (*Dioscorea rotundata*) varieties

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Abstract

Yams (*Dioscorea spp*.) are major foods of cultural, economic and nutritional importance in Nigeria and throughout West Africa. In this sub-region, white yam (*Dioscorea rotundata)* are the most dominant and important specie. This study aimed at characterizing high yielding yam varieties (*D. rotundata)* adapted to riverine areas and forest zones of Nigeria for physical and chemical characteristics. Eleven yam varieties collected from local farmers in the south-southern part of Nigeria were evaluated for their physicochemical characteristics, bioactive compounds (vitamin C, phytic acid and tannin), functional and pasting properties. Results indicated that there are significant varietal differences ($P<0.05$) among the parameters evaluated. The moisture content of the investigated varieties ranged from 59.5 to 68.8% with a mean of 63.7%, ash content ranged from 1.39 to 2.93% with a mean of 1.98%, protein content from 1.96 to 4.90% with a mean of 2.91%, fat content from 0.356 to 3.39% with a mean of 1.20%, and free total sugars from 1.05 to 7.02% with a mean of 3.36% and total starch from -33.9 to 75.7% with a mean of 56.7%. The bioactive content results show that vitamin C content ranged from 5.64mg/100g to 6.99mg/100g with a mean of 6.49mg/100g, phytate from 1.12 to 2.37% with an overall mean of 1.82%, and tannin from 0.359mg/g to 1.8mg/g and an overall mean of 0.708mg/g. The pasting properties results show that peak viscosity ranged from -215 to 470 RVU, trough viscosity from 198 to 385 RVU, breakdown viscosity from 8.71 to 84.5 RVU, final viscosity from 278 to 571 RVU, setback viscosity from 66.2 to 204 RVU; peak time ranged from 4.97 to 7.0 minutes and the pasting temperature from 61.7 to 62.6^0C. This study showed that the physical and chemical characteristics of these yam varieties were similar to those reported for most yam varieties in other parts of Nigeria and has a great potential as source of bioactive compounds and protein.

Key words: Physicochemical Characterization, selected White yam (*Dioscorea rotundata*) varieties

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Quantitative characterization of nutritional components, amino acids and diosgenin in tubers of *D. cayenensis* cv. Alo from Edo State, Nigeria

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Abstract

It is known that the sapogenin, diosgenin, mucin, allantoin, choline, dopamine and adenosine are contained in tuber of some kind of *Dioscorea* plants. Diosgenin is a phytoestrogen, or plant-base estrogen, which can be chemically converted into a hormone called as progesterone. Diosgenin was used as to make the first birth control pills in the 1960s. Previous studies have reported that *D. esculenta* contained 25 mg $100g^{-1}$ (FW) of diosgenin in the tuber and used for some commercial medicines and supplements. Although *Dioscorea* plants are expected for various effects on medicinal purposes in developed country, the functional ingredients of those cultivation species are not well documented in Africa. The objective of this paper is to present the characterization of nutritional components (protein, fat, ash, carbohydrates, calorie), amino acids (arginie, lysine, histidine, phenylalanine, tyrosine, leucine, isoleucine, methionine, valine, alanine, glycine, proline, glutamic acid, **serine, threonine, asparagine acid, tryptophan, cystine) and diosgenin content in tuber of D. cayenensis. The tubers were washed and dried at 80C for 4 days before the protein, fat, ash, carbohydrate, energy, amino acids and diosgenin content were measured. The protein, fat and ash were determined by Kjeldahl method, acid hydrolysis method and incineration method** respectively. Carbohydrate was calculated by formula which is100 - (water＋ protein＋ fat＋ ash). Energy was calculated by energy conversion factor. All amino acid except tryptophan were determined by amino acid analysis and tryptophan was determined by HPLC. The content of diosgenin was determined by HPLC. Analysis revealed that 4.1 $g100g^{-1}$ (DW) of protein, 0.5 g $100g^{-1}$ (DW) of fat, 1.9 $100g^{-1}$ (DW) of ash, 86.2 mg $100g^{-1}$ (DW) of carbohydrate and 366 kcal $100g^{-1}$ (DW) of energy was contained in the tuber, respectively. 3138 $mg100g^{-1}$ (DW) of total amino acid and 86 mg $100g^{-1}$ (DW) was contained in this tuber. This information is first report in *D. cayenensis* and the effect on human health will be studied promptly.

Key words: Diosgenin, yellow yam,

Resource Use Efficiency and Profitability Analysis of Sweet Potato Production in Kano State, Nigeria.

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Abstract

This study examined the resource use efficiency and profitability of sweet potato in Kura Local Government Area, Kano State. The primary data used in the study were obtained with a two – stage sampling technique using structured questionnaires administered on 80 sweet potato farmers (respondents). Descriptive statistics, gross margin and regression analysis were used for the analysis of data. Estimated gross margin was N 35,200/ha with an output/input ratio of 2.40 which shows that sweet potato production is profitable in the study area.52% of the farmers were using manual labour as compared to the ones using machinery. The regression result shows that fertilizer, seed (vines) and agrochemicals were positive and significantly at 5% related to output (Y). The R^2 of 65 % indicates that 65 percent of the variations in dependent variables were explained by the independent variables. Measure of the resource use efficiency shows that all the resources used by the farmers were not efficiently utilized. It is recommended that sweet potato production should be increased. Efforts should be made by researchers on product and market development as well as measures to solve the short storage life and perishable nature of sweet-potatoes. Inputs such as fertilizer, agrochemicals and farm macchinery should be subsidized to encourage the use, as this will go a long way to increase production.

Key words: Resource use efficiency, sweet potato, production.

Yam bean (*Pachyrhizus erosus*) Processing in Benin

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Abstract

The underutilised legume-root crop Yam Bean (*Pachyrhizus erosus*) was proccessed into various foods. Fresh Yam Bean roots harvested at 6 months old from the experimental fields of the Agricultural Research Centers of Niaouli and Savè were processed into flour. The flour was used in various foods preparation such as cooked stiff pastes, gruels and a snack called "atchonmon". These food products were submitted to panellists for sensorial quality evaluation. The overall appreciation of the panellists was positive for all three foods prepared either with 100% Yam Bean flour, or with the mixture of 50% - 50% Yam Bean flour and maize flour (cooked stiff pastes and gruels) and 50% - 50% Yam Bean flour and wheat flour (atchonmon).

On the other hand, the effluent expulsed as waste from fresh Yam Bean roots during processing into flour was used to prepare hard and soft drinks. So, Yam Bean juice was extracted from the tubers after grating the tubers and pressing the mash. Sugars in the juice were identified and quantified using a High Performance Liquid Chromatograph (HPLC). It appeared that Yam Bean juice contained 12.32 mg/ml of sucrose, 21.01 mg/ml of glucose and 14.08mg/ml of fructose. Results from the effluent processing showed the usefulness of this waste which allowed to obtain alcoholic liquor and sweet juice positively appreciated by panellits. Considering that the peels were used as to nourish animals, the study showed that the whole Yam Bean tuber can be utilized in food and feed.

Key words: Yam Bean, legume-root crop food and feed, cooked stiff paste, soft and hard drinks, HPLC.

Effect of Drying Method on the Properties of Cassava Chips

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Abstract

Cassava chips drying done by sun have its drawbacks. This necessitates drying artificially (mechanical dryers). This study was done to investigate the efficiency of other drying methods in conjunction with different cassava varieties, physicochemical and pasting properties. The result showed that the starch content ranged from 43.62% to 72.70%, the sugar content ranged from 0.77% to 5.07%, the carbohydrate ranged from 48.30% to 76.74%. The protein content ranged from 1.15% to 2.65%, the ash content ranged from 1.00% to 2.91%. The moisture content ranged from 9.33% to 13.06%, the fibre content, ranged from 1.47% to 1.87%. The result of the functional properties of cassava chips showed that the moisture content ranged from 6.54% to 10.94%, water absorption index ranged from 192.49% and 304.26%. The amylose content ranged from 15.91% to 23.72%. The water binding capacity ranged from 136.73% to 186.59%, the degree of starch damage ranged from 1.69% to 2.60%, swelling power ranged from 11.86% to 16.24%, while the water solubility index ranged from 9.15% to 15.52%. The pasting properties of cassava chips showed that the peak viscosity ranged from 346.5RVU to 480.30RVU, the trough viscosity ranged from 138.38RVU to 197.29RVU and the break down viscosity ranged from 135.54RVU to 271.92RVU. The final viscosity ranged from 196.29RVU to 296.92RVU, the set back viscosity ranged from 37.17RVU to 112.56RVU. The peak time ranged from 3.45minutes to 3.91minutes, the pasting temperature ranged from 63.80oC to 65.15oC. The most acceptable chip was the one made from "Oko-iyawo" variety and dried using oven.

Key words: Cassava chips, proximate, functional and pasting properties

Physico-chemical caracteristics of Cocoyam *(Xanthosoma sagittifolium)* flour and his utilization in bakery

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Abstract

The aim of this study was to assess the physicochemical composition of cocoyam (*Xanthosoma sagittifolium*) flour and his utilization as a partial substitute for wheat flour in making bread. This study was done to investigate the nutritional value of composite flour and general acceptability of composites bread (wheat/cocoyam) samples. For this, a survey was conducted to determine the distribution, time of planting and harvesting, processing and uses of taro varieties in some parts of Benin. Four (04) varieties (two of which belong to the *Colocasia esculenta* species and the other to *Xanthosoma sagittifolium species)* were recorded. The mean value of proximate composition of cocoyam flour were; crude protein (3.68%), crude fat (1.12%), crude fibre (0.75%), carbohydrates (84.79%) and ash (2.69%). Proximate chemical composition of all composite flour shows that the increased of substitution ratio of wheat flour with cocoyam flour resulted in decreasing of crude protein and moisture content, while the other components increased with increasing level of cocoyam flour in the blend. Regarding the mineral nutrient of flour samples studied, the cocoyam flour was composed of Na (106.42), K (1576.39), Mg (104.28), Ca (112.58), P (65.92) and Fe (49.54) (mg/100g). The mineral content of composite flour (wheat/composite) shows that the increase of substitution of wheat flour with cocoyam flour resulted in decreasing of P content, while the other mineral (Na, K, Mg, Ca and iron) increased with in increasing the level of cocoyam in the blend. The cocoyam flour has very white colour (L*=92.5; b*=3.7 and ΔE=9.3) and his granulometry (69.92% of particle < 100 μm). The sensory evaluation scores of control and wheat cocoyam composite bread sample shows that the control bread (0%) and bread made of blends containing 5 and 10% were exhibited good organoleptic properties scores without any significant different among them. Loaf volume, weight and specific volume varied significantly ($P<0.05$) from 518 to 652.8 cm^3, 130.31 to 214.25 g, 4.115 to 5.235 cm^3/g, respectively. A substitute rate of 10% of wheat flour and cocoyam gave bread with loaf volume of 4.715 cm^3/g close to the value of pure wheat flour bread (5.235cm^3/g) and sensory well accepted by consumers. An economic study revealed that with a substitution rate of 10%, a baker can make an additional profit of 13 200 FCFA a day or 79 200 FCFA a week and 316 800 FCFA a month in a bakery whose consumed 400 kilogram (kg) per day.

Keys words: *Xanthosoma sagittifolium*, corms, cocoyam, flour, physico-chemical

The Effects of Storage Conditions on the Quality of Sweet Potatoes

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Abstract

Three sweet potato varieties (white, orange and pink) bought from a wholesale market and stored at three environmental conditions (50%, 70% and 90% relative humidity levels at a common temperature of 25oC) were used in this study. The aim was to determine the wound healing ability, sugar levels (in g/100ml total soluble solids) weight loss, respiration rates (ml/kg/h), sprouting and pathological decay over a period of four weeks. Determinations were done every week for all parameters except for that of wound healing which was carried out after six and eight days in storage respectively. Wound healing ability was established by lignification assessment using phloroglucinol (1% in 95% ethanol) and concentrated hydrocholic acid. Spouting was determined by manual counting and sprout length by measurement with a metre rule. Respiration rates were measured using Gas chromatography and sugars were determined with the use of a refractometer. Data was analysed by ANOVA using Genstat and means were compared using LSD at 5% significance level.

Wound healing ability among the sweet potatoes was strongly influenced by variety and storage condition ($p<0.001$). The pink variety was the best healer followed by the orange and white variety respectively. Sugar levels were highly significantly influenced by variety ($p<0.001$) and not by humidity. Lignin score correlated strongly with sugar content and was significant at 50% and 70% respectively ($r=0.746$, $p=0.005$; $r=0.696$, 0.011 respectively). Weight loss varied significantly among the sweet potato varieties and also among the respective storage environment ($P<0.001$). The white variety showed a strong response to humidity than the other two. Respiration rates were strongly influenced by varietal differences ($p<0.001$) in sweet potatoes but for the storage conditions the influence was only for three weeks. A high respiration rate correlated with a high weight loss among sweet potatoes. The orange variety however was able to virtually maintain a sound quality throughout the four week storage period. Sprouting also varied significantly among varieties and humidity levels. The pink variety from the three was the most rotting prone when stored at a high relative humidity.

Key words: Sweet potato, relative humidity, variety, , storage conditions

Quality Attributes of Sweet Potato [*Ipomoea Batatas* (L.) Lam] Flour as Affected by Variety and Processing Methods

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Abstract

The effect of pre-treatment methods (soaking in cold water, potassium metabisulphite solution, and blanching) and drying methods (sun and oven) on the quality attributes of flours from ten varieties of sweet potato (SP) was investigated. The quality attributes determined were proximate and chemical composition, as well as functional and pasting properties. Data obtained were subjected to multivariate analysis of variance (MANOVA) and Pearson's correlation. The constituents and functionality of the SP flours were characterized by moisture (8.06 – 12.86±1.13%), starch (55.76 – 83.65±6.82%), amylose (10.06 – 21.26±3.92%), total sugar (TS) (22.39 – 125.46±24.68 µg/mg), water absorption capacity (WAC) (140 - 280±26), water solubility (WS) (6.89 – 26.18±3.80), swelling power (SWP) (1.66 – 5.00±0.50), peak viscosity (PV) (24.50 – 260.92±52.61 RVU), trough (TRGH) (7.08 – 145.83±34.48 RVU) breakdown viscosity (BDV) (11.00 – 125.33 RVU), final viscosity (FV) (10.21 – 225.50±60.55 RVU), setback viscosity (SBV) (3.04 – 92.21 RVU), peak time (PTm) (6.07 – 9.06 min) and pasting temperature (PTp) (69.8 – 81.3 ºC). The interactive effect of variety, pretreatment and drying method on moisture, protein, ash, carbohydrate, starch, amylose, TS, mineral content, as well as Hunter colour parameters L* a* b*, WAC, WS, SWP, and pasting properties of the flours were significant ($p<0.05$). This study showed that significant varietal differences existed in the quality attributes of SP flour obtained. Pre-treatment and drying methods significantly affected the quality attributes of the SP flours. The wide variation observed in the quality attributes of the SP flours indicated that the SP varieties can be targeted for use in different food formulations and industrial applications.

Key words: Sweet potato flour, variety, processing, quality

Determination of rapid maturity index in white yam

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Abstract

This research studied rapid means to determine maturity index in white yam. Ten IITA accessions of white yam (*Dioscorea rotundata*) were used for the study. Harvesting of yam plants was done monthly from 3 months after vine emergence (MAVE) till when there was complete foliage senescence at 6 MAVE. Colour of yam plant (leaves, tuber skin and tuber parenchyma) and the chemical properties (moisture, sugar and starch contents of leaves and tuber) were determined. Colour indices of leaves, tuber skin and tuber parenchyma did not vary significantly ($p<0.05$) with plant age. There was decrease in moisture content of leaves, from 70.01% to 13.90%, and tuber, from 78.26 to 69.60%, from 3-6 MAVE. Sugar content of leaves declined by 14.68% between 3 and 4 MAVE, while peak value of 15.00% was obtained at 5 MAVE. Least value of 3.55% was obtained at 5 MAVE in the tuber. Least value of starch (24.29%) was obtained in the leaves at 5 MAVE. However, there was no significant difference in values obtained in the tuber between 4 and 5 MAVE (73.00% and 72.91%, respectively). A reduced value of 69.48% was obtained in the tuber at 6 MAVE. It could be concluded that the yam tuber is matured at 5 MAVE, which coincided in this case with 6 months after planting. Starch content of leaves could serve as a rapid index for determining tuber maturity since the tuber is matured when minimum starch is obtained in the leaves without corresponding increase in starch of tuber.

Keywords: White yam, maturity index, starch content, leaves, tuber

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Food security in Bangladesh: Performance of Cassava based on Nutrient content, Cyanide reduction and yield

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Abstract

Rice is a staple food of Bangladesh and its production is being challenged by erratic climate change. Deficit rice production, about two million tons per annum may be supplemented by selecting cassava germplasm to feed 16 million people of Bangladesh. Cassava (*Manihot esculenta Crantz.*) tuber contains mainly starch while the leaf is rich in protein and could be a potential source of food and feed. Other starch crops (wheat, corn, potato, sweet potato) complete with rice-land. In contrast cassava produce fairly good yield in non-rice poor soil *viz*., hill slopes and fallow high lands where most other crops almost fail. The total hilly area is 12% (17342km^2) in Bangladesh that may be brought under cassava cultivation. Experiments were conducted to determine proximate composition of tuber and leaf, means of detoxifying hydrogen cyanide (HCN) and yield in eleven cassava accession in 2009-'10. Results revealed that genetic variation for crude protein (CP) and other nutrients, HCN, starch and tuber yield existed. In tuber, CP varied from 1.4-4.5% (dry wt basis), HCN from 114.0-556.0 mg/kg fresh wt., starch from 16.11-30.52% (fresh wt basis) and yield 18.11-61.55 t fresh tuber/ha. In leaf, CP varied between 18.4 and 25.5% (dry wt. basis), HCN between 113.9 and 322.5 mg/kg fresh wt and biomass between 9.6 and 32.05 t fresh leaf/ha. Simple processing technique like chopping and concurrent drying at 50^{0}C for 24 h removed almost 95-100% HCN. These results indicated that opportunity exist to achieve food security for human and animal by screening good variety with high nutrient content, increased tuber yield and low HCN toxicity.

Key words: Cassava tuber, proximate composition, detoxification, starch,

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Physiological and Economic Implications of Leaf Harvesting on Vegetative Growth and Cormel Yield of Cocoyam (Xanthosoma sagittifolium)

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Abstract

Cocoyam leaves contain a lot of minerals, vitamins, thiamine and proteins and are used as nutritious spinach in Ghana. The underground cormels which are the major economic part provide easily digestible starch and are often used as substitute for yams and plantains when these become scarce in the dry season. The objectives of the investigation was to determine the effect of leaf harvest on plant growth and cormel yield of cocoyam and also to determine the appropriate age or stage of crop development to start leaf harvest and frequency of harvesting that will result in optimum cormel yield. The stages or times harvesting of leaves began were 12, 16 and 20 weeks after planting (WAP) and the frequency of harvesting were 2, 3 and 4 weekly intervals. Delayed harvesting at 20WAP produced significantly ($p<0.05$) more fresh cormels than 12 WAP. Leaf harvest beginning from 20 WAP produced higher cormel yield than early harvesting at 12 and 16 WAP by 39 and 11 %, respectively. Corm yield differences between the three harvesting times were not significant. Cormel and corm yield differences between frequencies of leaf harvest were also not significant. There were significant positive correlation between plant height, leaf area, number of leaves and cormel yield. The marginal rate of return (MRR) of changing from harvesting at 20 WAP at 4 weekly intervals to3 weekly intervals and subsequently to 16 WAP at 2 weekly intervals were 424 % and 521 % respectively. These MRR are above the minimum acceptable rate of return and therefore the two options are more likely to be accepted by farmers.

Keywords: Cocoyam leaf, cormel, partial budget, net benefit, marginal rate of return.

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Diversity of Arbuscular Mycorrhizal fungi in Soils under Orange Fleshed Sweetpotato in Western Kenya

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Abstract

Arbuscular mycorrhizal fungi (AMF) are soil fungi which form a mutualistic symbiosis with roots of several plant species. In this work, the diversity of AMF in soils from two orange fleshed sweetpotato (OFSP) growing districts in Western Kenya was assessed. Rhizosphere soil samples were collected from farmers growing OFSP varieties. A total of forty eight samples were collected, twenty four samples from each district, six for each of the four OFSP varieties. Previous crop grown was also noted. The soil samples were analyzed chemically for pH, organic matter, available phosphorus (P) and total nitrogen (N). Spore count for the samples was done before setting up trap cultures. Trap cultures were thereafter established using four OFSP varieties, *Allium porrum* L and *Glycine max*. The traps were grown for 150 days under greenhouse conditions, when the colonization, spore density and species diversity were assessed. Three genera *Scutellospora spp*, *Glomus spp* and *Gigaspora spp* were identified. *Scutellospora spp* was the most abundant genus with a spore abundance of 68 spores/25g of soil while *Gigaspora spp* the least abundant with 27 spores/25g of soil. It was also noted that colonization rates varied between the trap crops used. The frequency and intensity of colonization (56.7% and 32% respectively) was highest in *Allium porrum* L, and lowest in sweetpotato (20% and 12%). Knowledge on the presence and diversity of AMF is therefore an essential step in their utilization in crop production.

Keywords: Arbuscular mycorrhizal fungi, trap cultures, colonization, frequency, intensity.

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Evaluation of twelve introduced *Dioscorea alata* genotypes in four environments in Ghana

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Abstract

Dioscorea alata L., (water yam or greater yam) is the most widely distributed cultivated species of yam. In Ghana, it is second most important cultivated yam species. The species has an enormous potential due to its high utilization base and good storage qualities. There are no formal release *D. alata* varieties in Ghana. The objective of this study therefore was to identify most stable and high yielding genotypes, with good tolerance to anthracnose, and with good culinary and recommend it for release. Twelve (12) introduced genotypes from IITA were evaluated against a local check, *D. alata* cv Matches for establishment, anthracnose and nematode tolerance, and yield in 2 locations in 2 years (Fumesua and Ejura in 2010 and 2011). The experimental design was RCBD with 3 replications. Genotypes Tda_01/0046, Tda_01/0004, Tda_00/0003, Tda_01/0029 are the most stable and high yielding genotypes that combined anthracnose tolerance with good culinary characteristics. These genotypes are therefore earmarked for on-farm evaluation and subsequent recommendation for release.

Keywords: D. alata, Ghana

Constraints and Opportunities of *Pachyrhizus spp.* introduction in the Current Farming systems in Central and Southern Benin:

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Abstract

Agricultural productivity in Benin is challenged by poverty, food and nutritional insecurity and decrease of soil fertility. To remedy these challenges and improve particularly food and nutritional status of populations, a new crop *Pachyrhizus ahipa*. (Yam Bean) is being introduced in Central and Southern Benin. The present survey aims to assess constraints and opportunities of *Pachyrhizus ahipa*. introduction in the Central and Southern Benin farming systems. Municipalities were chosen in the agro-ecological zones of this part of Benin on the basis of poverty level, food security and nutritional status of populations. They are Ouèssè, Dassa-zoumè, Djidja and Kétou in the agro-ecological zone V (biggest zone); Djakotomey in the agro-ecological zone VI; Toffo in the agro-ecological zone VII and finally Dangbo in the agro-ecological zone VIII. In each of these municipalities, one (01) representative village has been chosen using results of previous works. A Rapid Rural Appraisal on the farmers' perceptions was led in each sampled village. Content analysis identified main variables rural household produce mainly for self consumption and for sale. Main production constraints are soil deterioration, insufficient labor availability, lack of financial means and finally climatic risk. The ex ante analysis of the *Pachyrhizus ahipa*'s introduction reveals the potential of this crop to fulfill many current constraints quoted up.

Key words: *Pachyrhizus ahipa*'s introduction; farming systems; constraints; opportunities; Central and Southern Benin

Agroadvisory System on Cassava using Cassava simulation Model SIMCAS

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Abstract

Cassava growth simulation model SIMCAS was developed with the aim of applying it for agro advisory purpose. Location and variety specific potential tuber yield at a given weather is calculated by the model. The most suitable planting time to achieve maximum yield from cassava in a locality can also be found out from this model. For this purpose historic weather data of the locality should be analyzed to find out the general weather situation of the locality. The model can be run using known weather data and different dates of planting to find out the most suitable planting time. The yield levels for different varieties can also be computed. Varietal parameters are computed separately and these are used by the model for simulating their growth. Potential dry matter production on each day is modified by stress experienced by the crop. This model calculates stresses due to shortage of water, nitrogen and potassium only. Each stress is calculated separately and reduction from the potential yield is calculated.

Once the potential yield is found out, proper management practices should be followed to maximize the yield. This model helps in reducing losses and wastages of moisture, nitrogen and potassium and to maximize yield by applying the required quantity at proper time. The model also calculates the stresses due to shortages of moisture, nitrogen and potassium on crop growth and yield.

Key words: Agroadvisory System, cassava simulation model SIMCAS

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Preliminary Results of Investigation and Screening of Cassava Germplasm for Drought Tolerance in Malawi

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Abstract

A study was initiated to investigate cassava germplasm for drought resistance/tolerance to drought in Malawi. Thirty three clones were planted in potted experiment at Chitedze research station using a split plot design where main plots were drought induction period of no induction, 30 days induction and 60 days induction while sub plot was varieties. Data were collected two weekly intervals for a period of three months. ANOVA, Cluster Analysis, Principal Component Analysis (PCA-Biplot) and Discriminant Analysis were all performed in order to discern specific responses of the cassava clones to drought stress as manifested in the physiological and morphological traits measured. It was very clear that the three drought regimes imposed had significant effects on the general performances of the clones on the traits measured. The clones reacted significantly ($p<0.01$) differently with different drought stress. The set of most effective discriminating traits also differed with different drought stress. But clones that showed consistency in optimising the most effective traits in the three regimes were identified. That is, scoring high for good traits like plant height; stem girth, etc. and low for bad/disease traits like stem die-back, leaf senescence, etc. Based on these considerations the following clones (CZ07/084, MK05/0906, Mbundumali, CH06/033, CH02/0066, CZ07/002., CZ07/004, NDL/90/034, CH05/149, and. 01/1316) emerged as the promising ones, listed approximately in order of performance. The preliminary results are being used to continue further screening large population in the drought prone areas. Furthermore investigations on genetic understanding of these clones traits are very important.

Keyword: Cassava, drought resistant/tolerance,

Assessment of multiple disease resistance in select current cassava breeding varieties in Nigeria

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Abstract

Forty three cassava varieties in a multi-location uniform yield trial at five benchmark sites in Nigeria in 2008 and 2009 were assessed to get the number of varieties with disease resistance to cassava mosaic disease (CMD), cassava bacterial blight (CBB) and cassava anthracnose disease (CAD), singly and in combination. The 43 clones constitute important breeding materials at the International Institute of Tropical Agriculture targeting farmers in Nigeria. Results showed that 30 varieties were consistently resistant to CMD in all 5 bench mark sites (Ibadan, Ikenne, Mokwa, Ubiaja, Zaria), three resistant to CAD in two sites only, and two varieties were resistant to CBB only in the Ibadan location. TMS I000203, TMS I000378, TMS I011371 were both resistant to CAD and CMD in 2-5 locations across years. In combination to resistance of CMD and CAD, TMS I000203 was moderately susceptible to CBB compared to others. This paper shows tremendous improvement in CMD resistance and advocates for specific trials that select for low CBB and improvements in disease scoring systems.

Key words: Cassava mosaic disease, cassava bacterial blight, cassava anthracnose disease, disease assessment, genotype by environment interaction

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Farmer-oriented Technologies to respond to climate change: a case study in cassava

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Abstract

This paper outlines approaches and prospects for the development of genetic and management technologies to address short and long-term effects of climate change on the livelihoods of cassava farmers.

Uncertainty has always been a way of life for farmers. Further, they are one of the most vulnerable groups likely to be affected by the looming uncertainties of climate change. The long-term climate trends – drier or wetter, warmer or cooler – are what get the attention in the press, and the most consideration at the policy level. But for farmers, their compelling anxiety is more often about how climate change can increase short-term uncertainty -- *within* a growing season and from one year to the next. Current climate change models have limited power to address these seasonal variations. There are no models of any reasonable reliability that tell a farmer what to expect throughout a growing season, especially when that growing season is for nine months to a year or more, such as for cassava. These short term challenges need to be a high priority for research, while also taking into account projected long-term trends that include higher temperatures, change of long-term precipitation patterns and higher levels of atmospheric CO_2.

Among the most effective of these responses will be biologically-based, effective and low-cost solutions such as genetically improved varieties and integrated pest management. While breeders have a long experience in raising yield potential and selecting for tolerance to predictable drought, the new challenge will be to combine yield potential with resilience in the face of unpredictable variations in the production environment. A resilience strategy has two broad fronts. One is to incorporate specific resilience traits, and the other is to provide a wide range of variability to farmers, in order to cover an array of biotic and abiotic stress scenarios. Climate change means higher research investment if new technologies are to adequately address risk and uncertainty.

Key words: Farmer-oriented technologies, respond, climate change, case study, cassava

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Development of Interspecific hybrids between three American Yam bean species (*Pachyrhizus* spp.)

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Abstract

American yam bean (*Pachyrhizus* Richard ex DC.), a neotropical legume, is cultivated in Latin America and Asia for its edible and crunchy storage roots. Because of their low dry matter content and 'fruity' nature, roots are usually consumed raw. In order to increase root dry matter content and promote a wider use of American yam beans for food and starch processing interspecific crosses were made between *P. tuberosus* (Chuin) germplasm originating from the Peruvian Amazon and two other domesticated yam bean species: *P. ahipa* native to the Andean highlands and *P. erosus* originating from Central America. While the 'Chuin' type is characterized by high storage root dry matter content, *P. erosus* is high yielding and drought tolerant and *P. ahipa* performs well in high altitudes. The breeding experiment was designed as a completely diallelic cross between three *P. ahipa* and three *P. tuberosus* accessions and between three *P. erosus* und three *P. tuberosus* accessions. Nine *P. ahipa* x *P. tuberosus* (Chuin) F1 cross populations as well as 9 *P. erosus* x *P. tuberosus* (Chuin) F1 cross populations were developed. Hybridity of interspecific progenies was confirmed by morphological and agronomical evaluation and multivariate statistical analysis. Hybrid plants were generally fertile and vigorous. The resulting 18 F1 interspecific and 12 F1 intraspecific cross populations are used to generate a large number of F2 lines that serve to select genotypes with high dry matter and high starch content as well as good adaptation to a broad range of environmental conditions.

Key words: *Pachyrhizus* spp., American yam bean, interspecific hybridisation, legume root crop, pre-breeding

Cracking the challenges of producing and regenerating friable embryogenic callus from farmer preferred cassava cultivars

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Abstract

For more than one decade, researchers have been working to generate the friable embryogenic tissue (FEC) for cassava cultivars with little success, due to the differential response of cassava genotypes to growth factors, in terms of concentrations and combination's. FEC are morphogenetically competent and highly prolific cells, ideal for insertion and intergration of agronomic desirable traits. The objective of this study was to determine conditions suitable for production and regeneration of friable embryogenic callus from Ugandan farmer preferred cassava cultivars (UFPCC). Ten stem cuttings each from the UPFCC; Aladu, Bukalasa, Ebwanatereka and control 60444 were established on the standard murashige and skoog (MS) basal media. Leaf lobes 2-6 mm in length were established on picloram- based embryo induction medium (P-EIM) for initiation of Organized embryogenic callus (OES). Resulting OES, measuring 1 mm^2 were established on modified friable embryogenic callus induction maintenance medium (MFEC-IM) for transition to friable embryogenic callus (FEC). Subsequently, a colony (0.16 cm^2) of nontransformed FEC were established on embryo maturation media (FEC-EM) and later on embryo regeneration media (FEC-RM). Amino acid tyrosine favoured production of FEC in Aladu and Ebwanatereka, but not 60444. 20 g/L of sucrose trigged production of FEC in Aladu and 60444, while 40 g/L of sucrose was vital for Ebwanatereka. 1 ml/L of naphthalene acetic acid (NAA) facilitated embryo regeneration in Ebwanatereka and 60444, while 5 ml/L of NAA for Aladu. Light, tyrosine and sucrose were essential for FEC production, while NAA for regeneration. More need to investigate mechanisms that trigger FEC production.

Keywords: Cassava (*Manihot esculenta* Crantz) cultivars, somatic embryogenesis, Amino acids, carbon sources, auxins.

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Opportunities to Shorten the Breeding Cycle in Cassava and Increase Gain from Selection using Genomic Selection

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Abstract

Genomic selection (GS) offers an opportunity to reduce the time needed to complete selection cycles in cassava since selection can be made based on genotypes rather than waiting until there is sufficient planting material to select based on phenotypes. Expected gain from selection per unit time can be increased for quantitative traits like storage root yield. The time from seed production to release of improved varieties could be reduced. Genomic selection depends on statistical modeling of a training population that is used to estimate the breeding values of potential parents based on relationships between genotypes (SNP markers) and phenotypes (field evaluation data). In the IITA cassava breeding program, elite breeding lines have been clonally propagated and evaluated each year in a germplasm maintenance nursery called 'Genetic Gain'. This population of elite breeding lines and the associated multi-environment evaluation data provide the genotypic and phenotypic data to develop a training population. Cassava breeding cycles typically take at least two years and can take many years due to the 12-month cropping cycle and the slow rate of multiplication to have sufficient planting material required for multi-environment field trials. This paper will present a strategy to apply genomic selection to cassava in West Africa using an annual cycling procedure to produce new seedlings, selections based on genotypic data and new hybridizations in a repeating one year pattern.

Keywords: Genomic Selection, accelerated breeding, genetic gain, cassava

Farmers' adoption challenges, preferences for yellow-fleshed cassava product and selection criteria for research intervention through participatory rural appraisal (PRA).

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Abstract

In spite of diligent efforts by National Roots Crops Research Institute (NRCRI) Umudike and International Institute of Tropical Agriculture (IITA) to make Nigeria the largest producer of cassava in the world, the adoption rate of elite cultivars by farmers is very low because of some production constraints and consumers preferences. In addition, all cassava cultivars presently grown in Nigeria are very low in vitamins and protein content and predominantly high in cyanide content. A participatory rural appraisal (PRA) and sensory evaluation was conducted in Abia, Imo and Ebonyi states, known to be the food basket of the South-Eastern Nigeria, to assess farmers' preferences and selection criteria for cassava with yellow fleshed root for future intervention at NRCRI Umudike cassava breeding programme. Almost all the farmers consume cassava or its products at least, once daily. More than fifty percentage (50%) of farmers in these states have not heard or read of vitamin A enrichment in cassava through breeding. Seventeen (17) cultivars (both released and pre-released) were grown in the surveyed areas, with more that 70% identified as bitter, indicating the relatively high prevalence of bitter cassava in these states. Some of the farmers' preferred traits are high yielding, early maturing, pests and diseases tolerance, yellow fleshed roots, sweetness, high dry matter content, easy peeling, marketable roots and root that keep long in ground without decaying. Root dry matter content for the most preferred cultivars was high (above 40%), and found to be important in both sweet and bitter cultivars. These traits identified and preferred by farmers do not occur in isolation but are interrelated. Because farmers select cultivars based on multiple criteria, participatory rural appraisal and selection at the early stages of evaluation and selection is essential for a successful cassava breeding programme in southeastern agro-ecology of Nigeria.

Key words: Farmers, Nigeria, Vitamin A, cassava, participatory rural appraisal.

Cocoyam Growth, Trends, Projections and Policy Options for Food Security in Nigeria for the 21st Century

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Abstract

Stakeholders in agricultural development in Nigeria are currently confronted with the onerous task of feeding over hundred and forty million people in the nation. The paper attempts to examine the productivity growth in cocoyam, trends, projections and policy options for food security in the 21st century Nigeria within the last decade (2000-2009) projected to 2025. The results show that the coefficients for the trend variable of cocoyam output and area were positive and significant at 10% level of probability. The growth rates of output, area and productivity of cocoyam increased by 3.14%, 1.99% and 1.11% respectively, confirming significant acceleration for output and area within the period. The contribution of area and productivity to the increased output of cocoyam was 63.73% and 35.57% respectively indicating that cocoyam output was due mainly to area under cultivation. Projected production, area and productivity of cocoyam indicate that production will increase to 7.18million metric tones, 0.79million ha and 8.54t/ha by the year 2025. These simulations indicate that cocoyam will play economically important and increasingly diversified roles in Nigeria food systems over the next decade if yield is increased. To realize the cocoyam potential in this area (productivity), a combination of new technologies and improvements in the institutional and policy environment will be required. There needs to be a multilateral institutional mechanism that facilitates giving higher priority to broad-based agricultural research and collaboration among national and international research systems.

Key words: Cocoyam, Trends, projections and policy options

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Impact of Climate Change on Root and Tuber Crops Production and Diversity In West Africa Countries: An Econometrics Analysis

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Abstract

West Africa is home to centers of origin of many tuber crops such as yams, sweet potato, potatoes, cassava, carrot and many others. However, these foods are under-consumed, yet could solve the problem of food crisis experienced by the continent. Thus climatic factors and the structure of agriculture, dependent on cash crops are huge disadvantages to the production and permanence of food on the continent. In recent years, Africa suffers from many climatic disturbances among others, changes in temperature and movement of the seasons, the decrease in rainfall, drought and the drying up of streams connected to strong sunlight ...). Studies by the Intergovernmental Panel on Climate Change (IPCC) show that rainfall will decline again in the dry lands in Africa (IPCC Report 2007). This study aims is to analyze the impact of climate change on root and tuber crop productivity and diversity in West Africa countries. We use data from FAO, AGRISTAT, IPCC data and GPPC database to estimate the impact of climate (temperature, rainfall) on root and tuber crop productivity in one step and to estimate impact of climate on root and tuber diversity through an econometric regression using panel data. The results from this study will highlight the link between climate change and tuber and root crop production and to make recommendations for decisions of agricultural and environment development policy.

Key words: Climate change, production, piodiversity, uber and root crop, panel data

Building Sustainable Market linkages through Innovations Platforms for Technology Adoption: Case studies from Uganda, Kenya and Tanzania

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Abstract

Finding and sustaining markets for Orange-fleshed sweetpotatoes is a challenge in many parts of East Africa. Farmers face numerous difficulties in identifying credible business partners, while traders and other market chain actors are frustrated by inconsistencies in supply. In the Dissemination of New Agricultural Technology in Africa (DONATA) OFSP project, Innovation Platforms for Technology Adoption (IPTAs) in Ethiopia, Kenya, Rwanda, Tanzania and Uganda have brought together relevant value chain stakeholders to develop institutional mechanisms which have supported the up-scaling of OFSP technologies (e.g. new varieties, agronomic practices, and post-harvest activities) and marketing strategies. This paper presents key strides attained in accessing equitable markets by IPTAs in three DONATA project countries. While some IPTAs have segmented the market and differentiated the producer groups along product lines, others have supported various chain actors to strengthen their businesses thus increasing throughput to the markets. Hence in the former case, groups are classified along major OFSP products marketed (vines, roots and processed products), while in the latter, specialized actors take on these functions. Successes include firm contracts for supply of OFSP flour to supermarkets in Kenya, supply of roots to urban markets in Uganda, and sale of vines to individuals and organizations in Tanzania. The major challenges include aligning production to demand for consistent supply, poor market infrastructure and low consumer awareness of the benefits of OFSP. Future prospects lie with newly established relations with big buyers and also working closely with other initiatives to consolidate gains achieved to date.

Keywords: Market access, strategies, value chains, innovations, technology uptake.

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Gender Implications for Sustainable Seed Yam Production using Yam minisett Technology in South Eastern Nigeria

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Abstract

Reports have shown that the failure of most agricultural development projects to consider gender issues in the process has resulted to low adoption and lack of sustainability of such projects. This is because the ability to utilize appropriate agricultural technologies by farmers in developing countries like Nigeria depends mostly on the availability of production resources and accessibility of such technologies. This is often determined by the gender of the clients. Gender determines roles, priorities, problems, access to, and ownership of resources among farmers which affect their ability to use any available agricultural technologies to improve their production potentials. In line with the foregoing issues, this study was thus designed to appraise the extent of adoption of yam minisett technology among farmer gender, identify factors of production influencing the use of the technology on gender basis, and make recommendations. Multistage sampling technique was employed in selecting 480 yam farmers from five states in Southeastern Nigeria. Interview schedule was used in data collection. Descriptive statistics and multiple regression analysis were used for data analysis. Results show that the male farmers had higher levels of awareness and adoption rate of the technology than their female counterparts. The production factors that positively and significantly influenced the use of the technology by male farmers were farm size (5.87***), minisett dust (2.65**) and labour (2.81**) while fertilizer (-2.24**) and other inputs (-2.94**) had negative and significant effects on their adoption. On the other hand, the factors that positively and significantly influenced the adoption of the female farmers were farm size (5.00***), minisett dust (3.23***) and labour (10.77***) while the other factors though not significant, had positive effects on their adoption. It was recommended that awareness campaign should be increased among female farmers to enhance their adoption. Meanwhile, the male farmers should reduce the rate by which they use fertilizer and other inputs. In addition, the federal and state governments should ensure the availability and accessibility of those production factors that are important in the use of yam minisett to both gender categories but most especially to the female farmers. This will go a long way in enhancing adoption, increasing seed yam production and ensuring sustainability of the technology in the zone.

Keywords: Gender, seed yam, yam minisett technology

Spatial integration and price transmission in selected rural and urban markets for cassava fresh roots in Nigeria

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Abstract

An advanced time series econometric technique was used to study the interaction between the prices of cassava fresh roots in typical urban-demand and rural-supply markets in Nigeria. The price data cover 95 weeks from week 37 of 2004 to week 28 of 2006. The Augmented Dickey-Fuller (ADF) test was used to investigate stationarity in the prices while Johansen cointegration test procedure, with its associated vector error correction model (VECM) was used to measure the speed of adjustment coefficients that characterized the long run dynamics of the system. Unit root tests revealed non-stationarity in both price series: in levels the ADF-test statistics were calculated as -1.68 for the rural price and -2.69 for the urban price and in first differences they were -13.98 and -11.91 respectively. Cointegration test revealed that both prices were cointegrated with the trace- and maximum eigenvalue statistics calculated as 18.79 and 16.38 each being statistically significant ($p<0.5$). The VECM reveals that any positive deviation from the long-run equilibrium would cause the system to respond with decreases in both the rural and urban prices, but the rural price responded faster. The impulse response analysis revealed that the rural price was more responsive to shocks emanating from the rural markets and the effect of the shock was calculated as 63.8% using the forecast error variance decompositions. The effect of rural price shock on the urban price appeared to be very infinitesimal at only 6.0% after about 10 periods. The Granger causality test did not reveal any significant causality link between the rural and urban markets prices, suggesting lack of clear trends in price leadership. The finding reveals the lack of predictability and reliability of markets for highly perishable and susceptible agricultural foods products. There is need to strengthen cassava value chains so as to reduce the volume of trade in raw roots among Nigerian farmers.

Key words: Cassava fresh roots, spatial integration, rural, urban, markets, price leadership, Nigeria

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Past Research Achievement on the Improvement of Enset (*Ensete Ventricosum* (Welw.) Cheesman) Clones

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Abstract

In the past various research activities have been conducted to generate new production technologies and to promote them to the end users. Enset only some limited works were conducted so far: attempts were made to collect and preserve all the possible enset germplasms in the country and currently, a total of 623 enset germplasms from 12 major enset growing areas of Ethiopia have been collected and conserved *ex situ* by the Southern Agricultural Research Institute of Agricultural Research at Areka. The other finding was Morphological characterization of enset clones based on phenotypic, quantitative and qualitative traits of enset accessions from six major enset growing areas of Southern region of Ethiopia. The result of the diversity index showed that low levels of diversity existed among the 279 Enset ventricosum accessions. *The other achievement was the* development of enset varieties for best quality and yield of kocho which was conducted on a total of about 400 enset accessions collected from the major enset growing zones (Kembat, Dawro, Gamo-Gofa, Wolaita, Sidama and Gurage) of SNNP Region of Ethiopia. The experiment resulted in the identification and release of six enset varieties, namely Yanbule, Gewada and Endale from early maturing (3 to 4 years) and Kelisa, Zerita and Mesena from late maturing (4 to 5 years). Future breeding researches should also focus on undertaking further work in exploiting the previously untraced enset growing areas of the country to collect all the possible enset accessions and preserve them for future use.

Key words: Research achievements, improving, Enset clones

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Strengthen Linkages between the Conservation and Use of Yam in Ghana

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Abstract

Interaction between genebank curators and plant breeders will increase flow of diversity into breeding programmes and directly to farmers.Yams (Dioscorea species) are major staple in West Africa. There are six dominant species in Ghana among which *Dioscorea rotundata* is the preferred and is believed to have originated from West Africa. Domestication of crop plants led to the selection for desirable plants leading to the extinction of genotypes which were selected against. Coupled with the destruction of habitat has also led to complete loss of plant diversity, species, gene and allelic diversity. To reduce the rapid loss of plant diversity, germplasm collection and conservation of the yam germplasm is crucial to the preservation and maintenance of the genetic resources. Yams are mainly propagated vegetatively, hence, conservation of its germplasm is challenging. Steps need to be taken to ensure removal of duplicates for core collections to be maintained. This study used SSR molecular markers to screen 285 yam collections at the CSIR-PGRRI. Out of 25 SSR markers primers screened, 14 did not produce scorable amplification products, 11 markers were thus used for the analysis. A total of 157 alleles were identified at an average of 14.27 alleles per loci. Allele size ranged from 127 to 355 base pairs. GENSTAT Discovery Edition and Darwin version 5.0 were used to analyse the data. Dendogram and similarity matrix generated revealed duplicates in cluster of *D. rotundata* and *D. alata* respectively. The analysis has helped in identifying mislabels and duplicates which will be rouged to maintain a core collection for effective management due to limited resources at the various genebanks.

Key words: Strengthen, linkages, conservation, use of yams

Effects of intercropping cassava with plantain in the forest region of Ghana on the populations and damage caused by the pest of the two crops

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Abstract

The practice of intercropping cassava with other crops especially plantain is quite a wide spread practice in the forest belt of Ghana, probably as a way of maximising the benefits from limited land resourcesDespite the long duration of the practice it appears very little attention had been paid to the impacts that these plants have on the pest organisms with which they are associated. While cassava is usually plagued by arthropod pests such as the cassava mealybug Phenaccocus manihoti Mat. Ferr. (CM), the cassava greenspider mite Mononycehllus tanajoa (Bondar) (CGM), etcwhich transmit the cassava mosaic virus disease and occasionally by the variegated grasshopper, Zonocerus variegates. Plantain on the other hand suffers destruction from nematodes and the banana weevils, Cosmopolites sordidus and harbour mites and spiralling whiteflies. A study was initiated at the CSIR-Crops Research Institute in two locations; Kwadaso and Assin Fosu to ascertain the impacts intercropping these crops have on the populations and damages caused by these pests within the association. Cassava and plantain were planted simultaneously with the cassava planted at 1X1M and the plantain at 12X12M in a randomised complete block design with five replications. The results so far indicate that cassava in plantain had a tendency to suppress the growth and development of the plantain, with intercropped plantain at least 5-6 weeks later in fruit maturation and producing fewer suckers. On the other hand, plantain in cassava encouraged growth in height of cassava (etiolation), but had a suppressing effect on branching. Population of mites (green and red), and whiteflies were similar for cassava planted sole or intercropped but significantly more mealybugs were recorded on sole planted cassava than on the intercrop. No Zonocerus grasshoppers were recorded in either field. Millipedes were recorded on cassava in both locations. More weevils were trapped under sole plantain than under mixed plantain but no differences in impacts were evident. More millipedes were recorded from sole cassava than from mixed cassava. Similarly, more rotten tubers were recorded for the sole cassava than for intercropped cassava, suggesting a relationship between millipede attack and rotting in cassava. It appears the relationships will evolve with time and may get to be better understood after two or more ratoons of both crops.

Key words: Effects of intercropping, cassava, plantain, forest region, Ghana, pest

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Whose standards matter? Piloting the implementation of Quality Declared Planting Material inspection guidelines for sweetpotato in Lake Zone, Tanzania

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Abstract

Ensuring that smallholder farmers access quality planting material can contribute to improved food security and poverty reduction. Standards and norms for Quality Declared Planting Material (QDPM) for vegetatively propagated crops were published by FAO in 2010. These were based on the recommendations of an expert consultation in 2007. To date there has been limited experience in translating these standards and norms into practical guidelines for visual inspection procedures for sweetpotato planting material produced by decentralised (tertiary level) multipliers. The paper describes how, through a participatory process, the FAO recommended standards have been translated into operational guidelines for the QDPM inspection of sweetpotato planting material in the Lake Zone Region of Tanzania. In the context of a research-for-development project, a case study approach has been used to pilot three different models with decentralised vine multipliers. The models are based on the concepts of self-inspection; team inspection; and external inspection. These models are being piloted in different agro-ecological zones which reflect: varying disease pressure, access to water and markets. The preliminary findings for disease and pest incidence in different varieties under each inspection model are compared against the FAO recommended standards. The technical, social and institutional implications for the on-going study and future inspection models are discussed.

Key words: Quality Declared Planting Material, sweetpotato, seed systems, inspection

Incidence and distribution of yam viruses in Côte d'Ivoire

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Abstract

Surveys were conducted in Côte d'Ivoire in 2009 and 2010 to determine the incidence and distribution of viruses infecting yams (*Dioscorea* spp.) in 79 locations covering all the major yam production zones. Incidence and severity (based on 1 to 5 scale, 1 = no symptoms and 5 = severe symptoms) in each field was estimated by assessing symptoms on 20 plants in a double diagonal transect. At least 5 leaf samples were collected per field for testing by enzyme-linked immunosorbent assay (ELISA), polymerase chain reaction (PCR) and reverse transcription-PCR (RT-PCR) for *Yam mosaic virus (YMV), Cucumber mosaic virus (CMV), Dioscorea mottle virus (DoMV)* and *Dioscorea infecting badnaviruses. Virus infected plants were observed in 76 of 79 fields, and within field incidence ranged between 5% to 90%. Virus incidence exceeded 50% in 59.5% of the fields surveyed. Virus was detected in 67% of the 485 samples collected for virus testing during the survey. More than one virus was detected in 40.6% of the virus positive samples. Incidence of Dioscorea badnavirus, YMV, CMV and DoMV was 58.5%, 53.2%, 2.2 and 1.2%, respectively.*
YMV = 173, CMV 7, DMoV = 4; Badnavirus in 190 samples
Seventy nine fields were surveyed and 486 leaf samples were collected for virus analysis. Symptoms were described and disease incidence was recorded. Each sample leaf was scored for severity (severity was scorded on a 1 to 5 scale).

Key words: Incidence, distribution, yam viruses, Côte d'Ivoire

Developing the Caribbean Region's Root and Tuber Industry through Value Added Product Development

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Abstract

Exploiting the value-added potential of root and tuber crops is pivotal for attaining food and nutrition security goals of the Caribbean Region. To promote increased production and consumption of root and tuber crops, it is important that the range of products available to consumers be diversified. Product diversification however requires in part, information on the chemical/nutritional properties of these popular local lines so that the products for which they are best suited can be identified. CARDI, in collaboration with Regional and International partners has made efforts to determine the proximate composition and physiochemical properties of some popular regional varieties of sweet potato, *Ipomoea batatas* L. and cassava, *Manihot esculenta* Crantz (carbohydrate, reducing sugars, vitamins). The proximate composition of the cultivars examined was typical of sweet potato and cassava but significant differences exist among cultivars in relation to the DM content and suitability for value added product development. Many of the cassava cultivars were suitable for making farine, with a range of 25% - 40% conversion ratio from meal to farine. For sweet potato, >50% of the varieties were most suited for flour and <20% for fries and juice. These observations are discussed within the context of expanding the current range of value added product and strengthening value chains for these commodities.

Key words: Proximate composition, sweet potato and cassava cultivars, value added product development

Yam Seed Tuber System in Nigeria

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Abstract

Yam is cultivated in about 3 million hectares in Nigeria. It is valued for its starchy underground tubers that constitute a staple of first place among most Nigerians. Yet yam tubers are expensive because the yam seed tubers (YST) account for over one third of the total cost of ware tuber production. The system for producing, handling, transporting, and marketing the YST is examined for Nigeria that produces over two-thirds of the global output of yam tubers annually. Trade flows from YST producing areas to areas where farmers use YST are considered as they relate to major ware yam producing areas of Nigeria. Price of seed yam fluctuates and is highest close to the planting season in March-June every year. Various investigations and trials are suggested to raise our understanding of the system would include: a) what are the requirement of the YST usersΔb) what is the cost of producing one hectare of yam cropΔc) what agronomic practices should be adopted different from those for producing ware yam tubersΔd) improved packaging for YST that will ensure a reduced loss during handling and transportationΔe) can the weight distribution of YST from vine cuttings, mini-tubers and mini-sett be influenced to generate an increasing proportion of ware tubers (over 1 kg)Δf) what is the transport cost of moving one tonne of seed tubers over one kilometerΔg) consider the potential for export of YST to other African nations to introduce yam culture to supplement food security efforts being undertaken; g) the consistent search to coordinate the system within a cluster of communities so that the overall effect of the system results in more YSTs, patho-sanitized or clean YST that are more efficiently produced and thus more likely to be affordable to a greater proportion of YST producers in the yam producing states of Nigeria. This should raise the chances of lowering the cost of producing ware yam tubers for food to more people who eat yam.

Key words: Yam Seed Tuber System, Nigeria

Clonal Seed Systems- Challenges, Prospects and Road maps for sustainable small and large scale Cassava farming in Nigeria.

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Abstract

Seed systems for the cassava industry have remained undeveloped and undefined in Africa. Over the years, conventional cassava multiplication and distribution approaches have introduced new seeds to farmers, but achieved low levels of adoption or later rejection. Recent value chain approach to seed systems distribution by cassava intervention projects have combined training, post harvest, processing and marketing issues with cassava multiplication and distribution. This paper reviews recent and ongoing approaches to introduction of new materials to farmers and the lessons learnt for sustainable cassava production at small and large scale levels.

Key words: Clonal seed systems, challenges, prospects and road maps, sustainable small and large scale, cassava farming

Building a Sustainable Sweetpotato Seed System in Malawi: Experiences from the "Rooting out Hunger in Malawi" Project.

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Abstract

The project "Rooting out Hunger in Malawi with Nutritious Orange-Fleshed Sweetpotato (OFSP)" was launched in October 2009 for the benefit of women and children in the country. This 4.5-year effort targets 115,000 households to improve vitamin A and energy intake using improved sweetpotato varieties. It also seeks to boost yields by 50% and improve incomes by 20%. The project aligns with the Agriculture Sector Wide Approach to food and nutrition security and crop diversification. With Irish Aid support, CIP initially worked in partnership with government agencies and three NGOs as implementing partners (IPs) and targeted 4 districts. The project established a "1-2-3" seed multiplication system, with clean planting material produced at a primary multiplication site, and decentralized vine multiplication sites (DVMs) doing multiplication at the community level. DVMs run by individuals or groups of farmers with access to irrigation were established by the IPs and supervised by district Extension staff. Mutiplication at the DVMs was termed secondary (vine production using rapid multiplication) or tertiary (production of both roots and vines, particularly during the hungry season). A subsidized voucher system was used by partners to allow at-risk households to purchase sweetpotato planting material from DVMs. Promotion and awareness campaigns were conducted in each district to stimulate demand for OFSP. By February 2012, the project had reached 36,403 households in 5 districts with subsidized vouchers, and an additional 19,331 beneficiaries through non-voucher sales. Seven IPs in 14 districts partnered in the effort. Lessons learned and sustainability of the system will be discussed.

Key words: Orange-fleshed sweetpotato, partnership, Malawi, seed system

Screening African Yam bean *Stephynostilis stenocarpa* for seed and tuber yield ability using metric trait indices

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Abstract

African yam bean is a legume with seed and tuber yield from a single plant stand. Genetic divergence in this crop is as a result of wide divergence in some of the seed traits including seed length, width, thickness, color and seed weight. The study on seed metric traits and their respective association with seed and tuber yield remains an untapped niche in International literature. This work determined the efficiency in the use of seed traits and the associated discriminations as indices for seed and tuber yield indicators in African yam bean. 30 African yam bean sourced from International Institute of Tropical Agriculture and local farmers' field were studied in the Teaching and Research Farm of Ladoke Akintola University of Technology, Ogbomoso in the cropping season of 2009 and 2010. Flatness index exhibited linear relationship with seed and tuber yield respectively. Seed length, weight and wideness gave wide genetic variations ranging from 35-89%. Selection and trait association parameters of Co-heritability, Coefficients of determination and correlation identified seed wideness, weight and thickness (0.84; 0.73 and 0.79) as indices for discriminating seed and tuber yielding capabilities in African yam bean. Seed flatness index associated positively with seed yield (0.69**) and having high and significant (P=0.05) impact with tuber yield (0.47^{**}). Negative but significant association was recorded for seed weight and tuber yield. This implies that breeding attention on tuber yield using seed weight would require complimentary influence of seed length and width for effective tuber yield improvement and that direct selection for seed width, length and thickness would give maximum seed yield.

Key words: Seed metrics, co-.heritability, selection indices, flatness index

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Qualitative Model of Potato seed systems: a Proposal to Converge Seed-related Biophysical and Socioeconomic factors

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Abstract

One of the most important constraints to potato production in developing countries is the lack of quality planting material to be used by farmers, either coming from the formal or from farmer-based seed systems. A number of projects have been implemented to improve farmers' access to quality planting material in different countries. However, these experiences have not been documented in a comparative or parallel way in order to understand the factors that influence success or failure and to extract lessons and guidelines that can support decision-making for future investments. This paper presents a proposal for modeling potato seed systems by identifying the key factors that influence the use of quality seed by farmers, which includes three main types of factors, namely 1) the biophysical factors related to seed degeneration and seed availability, both influenced by the presence of biotic (viruses, bacterial wilt, and other diseases, or pest such as potato tuber moth), and abiotic constraints (frosts or draughts that represent shocks that could threaten seed availability); 2) management factors, including farmers' own seed management practices and also the seed multiplication technologies used by the private or public sector in charge of seed supply, this influenced in turn by the existing regulatory frameworks; 3) demand and market related factors, which includes farmers' willingness to pay for quality seed, influenced by their perception about the added value of seed quality, the market demand for specific varieties, and the profitability of potato cultivation as a business. The proposed seed model aims at highlighting key factors that should be documented, analyzed and taken into account when planning seed potato interventions.

Key words: Seed systems, potato

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Timely Availability of Quality Sweetpotato Planting Material in Uganda: a chronic challenge with a solution

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Abstract

Sweetpotato is becoming more important as a staple and commercial crop in Uganda. However, one of the chronic constraints to its production is the shortage of high quality planting material at the right time. The Uganda National Crops Resources Research Institute (NaCRRI) supported by development partners has been developing and disseminating improved varieties; to date 20 varieties have been released. Stock seed (planting material) of these improved varieties is first accessed by farmers through hosting participatory on-farm trials. Thereafter most of the seed spreads through farmer to farmer exchange. This system of seed dissemination lacks a mechanism of quality assurance and leads to build up of systemic diseases and consequently decline in yield. NaCRRI also multiplies limited quantities of any new variety released and distributes to farmers. However, farmers keep coming back to request for the same planting material at every beginning of a season, suggesting that they lack seed conservation skills. Against this background, NaCRRI initiated a community-based seed system coupled with training of farmers on how to produce quality planting materials to ensure enough supply at the right time. Swamp conservation, fencing off and watering small garden portions with planting material around the compound and rapidly multiplying them at the onset of rains are some of the solutions. Selecting symptomless planting material helps in maintaining healthy stocks.

Key words: Sweet potato, quality assurance, planting material, timely availability