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Traditional African methods for cassava processing and utilization and research needs.

G. Eggleston, M. Bokanga and Y.W. Jeon

This paper summarizes the main steps which are involved in traditional cassava processing methods in Africa and the most common uses of cassava (*Manihot esculenta*) products, including gari and chikwangu. The key research areas which require attention are highlighted, with the emphasis placed on adopting an integrated approach to developing post-harvest technologies.

Economics of root crop processing and utilization in Africa: A challenge for research

F.I. Nweke

Processing and utilization are defined to cover a wide range of post-harvest activities in cassava (*Manihot esculenta*) and yams (*Dioscorea spp.*). Time-series data from various sources, particularly information generated from root and tuber crops studies conducted in south-east Nigeria 1984-85, form the basis of this paper. Storage losses in yam, dormancy in seed yam, instability in supply and demand for cassava, localized markets for cassava products which are differentiated by customs and preferences, and the high cost of cassava processing by traditional methods are highlighted as major economic issues in post-harvest activities in both crops. Directions of research efforts which could resolve some of these issues are also discussed.

Processing of roots and tubers: Developments efforts at the National Root Crops Research Institute, Nigeria

E. Oti, L.S.O. Ene, O.C. Aniedu and M.N. Obasi

The National Root Crops Research Institute (NRCRI), Umudike, has made efforts to improve farm processing and diversify the use of root and tuber crops. Studies have been made to employ machines produced in Nigeria, coupled with manual techniques to process these crops into convenience foods, organoleptically acceptable food, animal feed and industrial raw materials. An evaluation of processing equipment has found some to be efficient and economic to run and maintain. These are electrically and diesel engine - powered graters and a cassava pelleter produced by the Projects Development Agency (PRODA) and NRCRI; a mill, a starch extractor, tray fryers and drum dryers produced by the Rural-Agro Industrial Development Scheme (RAIDS); a dewatering machine fabricated at NRCRI; and a gari fryer-roaster produced by Fabrico. High peeling losses were recorded for a cassava peeling machine manufactured by PRODA. Farmers need to form cooperatives in order to benefit from these machines.

A.S. Abubaker

Major cassava (*Manihot esculenta*) and sweet potato (***Ipomoea batatas***) growing areas of Kenya were surveyed for the role of both crops in the nutrition and economy of the people and to identify production constraints. Most farmers plant the crops for home use although they are grown for cash in some regions. The survey showed the lack of suitable varieties to be a major constraint. Germplasm of 64 cassava and 111 sweet potato clones was collected and planted at four Kenya Agricultural Research Institute (KARI) centers. The collected clones will be evaluated for adaptability to different agro-ecological zones of the country.

Recherches sur les plantes à tubercules et racines au Cameroun: présent et perspectives

S. Nzietchueng et S.N. Lyonga

Les plantes à tubercules et racines, manioc (*Manihot esculenta*), macabo (*Xanthosoma* sp.) et taro (*Colocacia* sp.), igname (*Dioscorea* spp.), patate douce (*Ipomoea batatas*) et pomme de terre (*Solanum tuberosum*) occupent une place très importante dans l'agriculture vivrière du Cameroun. L'Institut de la recherche agronomique (IRA) dans le cadre de son Programme national d'amélioration des plantes à tubercules et racines (CNRCIP), effectue, depuis de nombreuses années, des recherches en vue d'accroître la productivité de ces cultures. Les résultats enregistrés et actuellement exploités par les cultivateurs camerounais sont rapportés. Leur impact sur le développement de ce secteur vivrier est examiné.

Tropical root starches in dough and crumb microstructures in relation to bread loaf volume

E.L. Keya

The microstructures of doughs and breadcrumbs which had been prepared from composite flours made by blending 15% of vital gluten with 85% of tropical root starch were studied using scanning and transmission electron microscopy. Changes in the dough volume from immediately after panning until 2 hours after baking were determined by using the rapeseed displacement method. The observed microstructures of the doughs and crumbs containing starches from arrowroot (*Maranta arundinaceae*), cassava (*Manihot utilissima*), yam (*Dioscorea cayenensis*), sweetpotato (*Ipomoea batatas*) and taro (*Colocacia esculenta*) were then related to their corresponding volumetric increases from dough to bread. From the results of this study the author concluded that root starch from different sources interacted differently with gluten at the microstructural level, which produced noticeable changes in the final loaf volume.

K. Imam and A.K. Metwaly

The effects of a cold storage period (1-5°C), the age and the size of stored roots on flower induction, flowering behavior and seed yield of carrot (*Caucus carota*) were studied. Results show that the period of cold storage significantly affects stem and umbel characteristics and flowering behavior. The optimum period of 60 days caused earlier flowering in the first- and second-order umbels and an earlier seed harvest. Seed yield per feddan, however, was not significantly affected by the period of cold storage. The size of root undergoing cold storage did affect seed yield, with large roots giving a higher figure per feddan than small ones, especially in second- and third-order umbels. Age had a similar effect on yield; roots which were 90 days old at the start of cold exposure gave a higher seed yield per feddan than those which were 120 days old. Correlation between the final plant stand, total seed yield and yield of different order umbels showed significant positive values, with the exception of the fourth-order umbels.

Cassava germplasm enhancement at the International Institute of Tropical Agriculture (IITA)

A.G.O. Dixon, R. Asiedu and S.K. Hahn

Cassava (*Manihot spp.*) improvement strategies at the International Institute of Tropical Agriculture (IITA) are discussed here in relation to the main constraints, target ecologies and utilization of exotic germplasm. Germplasm generated from DTA populations and from other African or non-African programs was evaluated at locations representative of the target ecologies. Selected clones or families were included in one or more special populations setup for specific objectives. Elite broad-based populations were constituted from some entries of the special populations for specific agroecological zones. Other factors examined were procedures to improve special and broad-based populations, the use of wild and exotic germplasm, the support required from national agricultural research systems (NARS) and the potential benefits.

Approches et méthodologies pour la sélection entomologique du manioc au Programme national manioc (PRONAM), Zaïre

H.D. Nsiama-She, M. Tshibanga et N.M. Mahungu

Des approches et des méthodes nouvelles ont été conçues et appliquées dans le processus général de la sélection et l'amélioration du manioc (*Manihot esculenta*). Le triage pour la résistance aux ravageurs en champ s'effectue après des infestations naturelles et artificielles aux jeunes stades du cycle de sélection. Ceci peut être supprimé sans nuire à l'intelligibilité et à la cohérence du résumé. La notion de triage par la cote maximale de sévérité (CMS) a remplacé celle de triage par la moyenne des cotes de sévérité (MCS) susceptible de sélectionner des pseudo-résistances. En outre l'approche et la méthode CMS permettent de cribler un grand nombre de matériels en un temps record et éliminent les calculs laborieux des essais reproduits.

Varietal response to drought stress in cassava

D.S.O. Osiru S.K. Hahn and O. Osonubi

Two sets of experiments are described in which the improved cassava (*Manihot esculenta* Crantz) varieties developed by the International Institute of Tropical Agriculture (IITA) were evaluated for their performance under drought stress. In one set, three varieties (TMS 30572, TMS 91934 and TMS 30555) and a local cultivar, Odongbo, were grown in pots under four watering regimes: early stress (ES); late stress (LS); stress throughout (ST); and no stress (NS). Regimes of ST and ES significantly reduced the number of roots per plant, root size and total fresh root yield in all varieties but LS had almost no effect on these components. The effect of stress was greatest on TMS 30555 and Odongbo. Both varieties had lower Drought Response Index under increasing stress, suggesting less tolerance to drought. TMS 30572 and TMS 91934 accumulated more dry matter in the feeder roots, and had higher Leaf Area Index (LAI) even under stress. In the second set of experiments, 10 varieties were evaluated under Field situations for stomatal conductance, transpiration rates and xylem pressure potential in dry and wet seasons. Diurnal stomatal conductance and transpiration rates had a similar pattern during both seasons, with peaks at about midday for all varieties. In the dry season, the diurnal stomatal conductance and transpiration rates of TMS 30572 were 50% less than those of TMS 91934, but in the wet season, TMS 30572 showed 160% higher diurnal stomatal conductance and transpiration rates than TMS 91934. Xylem pressure potential had no clear pattern. We suggest that the extent of feeder root dry-matter accumulation and the ability to maintain higher LAI under drought stress are important criteria when selecting varieties for drought tolerance.

La sélection du manioc en République Populaire du Congo: situation actuelle et perspectives d'avenir

J.M. Mingui et J. Mabanza

La sélection a joué ces quinze dernières années un rôle de premier plan dans l'augmentation de la productivité du manioc (*Manihot esculenta*) au Congo. Depuis l'apparition en 1973 des grands fléaux, la cochenille (*Phenacoccus manihoti*) puis la bactériose due à *Xanthomonas manihoti* un travail a été effectué sur les prospections et les collectes des cultivars locaux, sur la mise en collection du matériel végétal local et introduit, et sur la caractérisation et l'évaluation du germoplasme. Des variétés sélectionnées plus productives, résistantes ou tolérantes aux différents fléaux, zonalisées ou à grande souplesse d'adaptation et diffusées actuellement chez le paysan, sont susceptibles de faire passer les rendements moyens habituels de 7 à 25 t/ha en milieu paysan. Les résultats obtenus jusqu'alors ouvrent des perspectives nouvelles sur les travaux d'amélioration de la résistance du manioc au complexe parasitaire sur la transformation, la technologie et la nutrition, sur l'agronomie et sur des systèmes de culture mieux gérés et reproductibles.

Quelques observations sur le TMS 30555 et ses hybrides avec deux clones locaux de manioc

N. Nsunbu, P. Phemba M. Ndonga et M. Nzau

Une expérience était entreprise à Yangambi en vue de produire des hybrides entre le TMS 30555 et deux clones locaux (Mbongo et F46) de manioc (*Manihot esculenta*), et d'observer quelques paramètres de rendement. Nous avons constaté qu'il est possible de réussir, en moyenne, 33% d'hybridations simples, 23% à trois parents et 18% à quatre parents. Les graines normales de ces hybrides simples germent en moyenne à 65%. Par rapport au témoin TMS 30555, les hybrides simples montrent une supériorité de 60, 33 et 25% respectivement pour le poids de tubercules/plant. L'indice de récolte et le poids moyen du tubercule. La teneur en fibres de leurs tubercules est de 37% plus faible. Tous les hybrides créés ont présenté un indice de sévérité inférieur à 3 pour les principales maladies.

D.Ndombo, N.M.Mahungu et S.Lukombo

Outre la sélection du manioc (*Manihot esculenta*) à haut rendement, résistant aux maladies et ravageurs, le Programme nationale manioc (PRONAM) accorde une attention très particulière à l'identification de manioc a pulpe jaune. Ce dernier présents des avantages nutritionnels par la présence de carotène (provitamine A), de calcium et aussi d'une faible teneur en acide cyanhydrique (HCN). Les clones à pulpe jaune sélectionnés par le PRONAM avaient montré une bonne teneur en matière sèche allant jusqu'à 40% avec un rendement en racines tubéreuses aussi élevé que celui des témoins à pulpe blanche. Différents constituants biochimiques des feuilles (protéines, HCN) et des racines (HCN) ont été déterminés. Les produits transformés à base des racines tubéreuses tels que le *foufou* et la *chicouangue* avaient une pâte jaunâtre indiquant ainsi la présence d'une certaine teneur en carotène.

State-of-the-art cassava production in Adamaoua, Cameroon, and implications for improvement

M.O. Akoroda

Cassava (*Manihot esculent*) in Adamaoua, Cameroon, occupies 29 000 ha and is grown on some 27 000 farms. A selection program to identify superior clones has been established at Meganga in Mbere division, which has over two-thirds the cassava area of the province. Since 1983 the program has received seeds annually from the International Institute of Tropical Agriculture (IITA) cassava improvement program. The criteria for screening/selection have been aligned with local consumer concepts and needs, and breeding objectives for cassava cover as many as 30 different features, although combining desirable characteristics often does not fit with the observable genetics of their inheritance. The cassava is harvested sequentially from 12 to 48 months, mostly at 18 to 24 months, and consequently selection for maturity at 12 months or less does not match the local environment. Adamaoua highlands (1000 m a.s.l.) are cool (22-23°C) and rainfall from mid-April to mid-October is insufficient to mature a crop. Therefore selection duration has been prolonged for the last two stages of clonal screening when the numbers of clones are few.

M, Mahungu, D. Ndombo, M. Bidiaka et S. Tubanza

Les feuilles de manioc (*Manihot esculenta*) sont un légume très apprécié au Zaïre. Cependant l'amélioration, et la sélection variétale étaient toujours axées sur la production de racines tubéreuses sans considération notable sur la quantité et la qualité des feuilles de clones sélectionnés. Depuis 1987, le Programme national manioc (PRONAM) a commencé à évaluer les clones en voie de sélection pour leur productivité en feuilles tendres dans le but d'identifier ceux ayant une bonne production en feuilles associée à un haut rendement en racines. La récolte mensuelle avait d'inné un rendement plus élevé (9 à 13 t/ha) que la récolte bimestrielle (6 à 10 t/ha). La réduction du rendement des racines tubéreuses était très forte (81 à 94%) pour la récolte mensuelle comparée à celle de la récolte bimestrielle (58 à 83%). Toutefois, le revenu total obtenu (feuilles et racines) provenant de la récolte mensuelle était supérieur à celui de la récolte bimestrielle et au témoin. Les feuilles de manioc préparées (*pondu*) étaient d'une qualité appréciable. Aucun clone n'était rejeté pour la qualité de son *pondu*.

S.Y.C. Ng

A study conducted to find ways of culturing mature embryos of cassava (*Manihot esculenta*) and related *Manihot* species revealed three media that support high development of plantlets: Murashige and Skoog's (MS) medium supplemented with 3% sucrose, 7% coconut water and 0.7% agar; 1/2 MS medium with 3% sucrose and 0.7% agar; and 1/2 MS medium with 3% sucrose, 7% coconut water and 0.2% gerlite. Growth of plantlets was most vigorous in the second medium, which was used to culture embryos dissected from seeds of several *Manihot* spp. Somatic embryoids were obtained from in vitro young leaves of several International Institute of Tropical Agriculture (IITA) cassava clones on liquid MS medium containing 5 or 10 ppm of 4-amino-3, 5, 6-trichloropicolinic acid (picloram) on a shaker. Some 10-15 somatic embryoids could be obtained from each leaf.

Contributions of three subterranean legumes to the productivity of cassava-maize intercrops on a tropical Ultisol

J.E.G. Ikeorgu. G.C. Orkwor and S.O. Odurukwe

Productivity of crop mixtures of cassava (*Manihot esculenta* Crantz), maize (*Zea mays* L.) and three subterranean legumes—peanuts (*Apioshyppogea*L.), bambara (*Vigna subterranea* Thouars) and kerstings (*Macrotyloma geocarpum* Harm) — was evaluated in late seasons of 1986 and 1987 on an Ultisol in south-east Nigeria. The objective was to assess the contribution of two indigenous subterranean legumes and peanuts to the productivity of cassava-maize-legume intercrop systems. Cassava root yield in the cassava-maize intercrops (17.05 t/ha) was reduced by 33, 25 and 22% in cassava-maize-peanuts, cassava-maize-bambara and cassava-maize-kerstings, respectively, whereas maize grain yield fell by 16, 12 and 23%, respectively. Pod yields of peanuts and kerstings were unaffected by intercropping but bambara yield was reduced by 40% in the cassava-maize-bambara intercrops. Calorie yield of cassava-maize-bambara (16.1 Kcals/ha/day) and cassava-maize-peanuts (14 Kcals/ha/day) was as much as that of cassava-maize (15 Kcals/ha/day) but cassava-maize-kerstings (11 Kcals/ha/day) was less productive. Combined Land Equivalent Ratio did not reflect the calorie productivity of the various cropping systems.

Intercropping oil palm with maize, cassava and live-mulch: Assessment of biological yields

A .Okpala-Jose and E.O. Lucas

In 1986 an experiment was initiated at a site with acid, sandy soil near Benin City, Nigeria, to assess the growth and yield of oil palm and food crops in intercropping systems over a 3-year period. The results showed that although oil palm performed better alone than when intercropped with maize, cassava and live-mulches or with cassava and live-mulches, for all observed Parameters except height (where intercropped palms were taller because of competition for light caused by cassava shade), the differences between intercrop combinations regarding growth and yield of the oil palm, maize and cassava were not significant. In maize height and grain yield were always enhanced when intercropped with winged bean. In oil palm, the number of leaves, girth and flower development were consistently better when cropped alone. The greater the number of species intercropped, the poorer the performance of the oil palm and food crops. The authors conclude that intercropping does not significantly depress growth and development of the oil palm and that farmer could intercrop their oil palm with maize, cassava and melon or cowpea live-mulch, especially at the early stages of growth of the oil palm

Performance of improved cassava clones under common cropping systems in southern Nigeria

A. Udealor, R.P.A. Unamma and H.C. Ezumah

The total intercrop and individual crop productivity of three improved cassava clones (TMS 30572, TMS 50395 and U/41044) and Nwanyiocha (best local clone), intercropped with improved TZE-SR-Y maize, were estimated on farms on the acid soils in Rivers State, Nigeria. The study sought to identify high-yielding cassava-maize mixtures to replace farmers' current practice by using new technologies developed at the National Root Crops Research Institute (NRCRI), Umudike and at the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria. The improved cassava clones out yielded the local control variety by 470-600%. Among improved clone, root yield of TMS 30572 was highest, although U/41044 with maize was the most productive based on bivariate analysis. As to their response to the environment, TMS 50395 gave the best yield in good environments; while TMS 30572 gave the best response in poor environments.

The effects of fertilizer, methods of leaf harvest and time of root harvest on cassava root yield

O.A. Osiname and K. Landu

The effects of fertilizer, methods of leaf harvest and time of root harvest on root yield of three cassava clones — Kinuani, F100 and Mpelo-longi — were studied in field trials at M'vuazi, Zaire. Leaf harvests significantly reduced root yields in the three cassava clones. However, the adverse effect of leaf harvest is on root yields diminished significantly with fertilizer application. Applying 50-50-50 kg/ha NPK reduced root yield loss caused by leaf harvest from 35 to 10%. Delaying root harvest to 15 and 18 months after planting did not significantly improve root yield after multiple leaf harvests from the cassava crop. The authors concluded that root yield reduction in cassava resulting from leaf harvests will depend more on soil fertility level than on crop age at harvest.

Performance of recommended cassava varieties in south-eastern Nigeria

J.A. Otoo, S.K. Hahn, V.I.Nwafor and E.M.Chukwuma

Fresh root yields and disease scores of African cassava mosaic virus (ACMV) and cassava bacterial blight (CBB) were collected in 1988-89 from several samples in farms where improved varieties had been recently introduced in five states in south-eastern Nigeria. The superior root yields seem to be primarily a result of resistance to CMV and CBB by the improved varieties.

Population studies of six cassava cultivars in Cameroon

J.T. Ambe. A.A. Agboola and S.K. Hahn

Cassava (*Manihot esculenta*) production population density was studied with six elite clones adapted to the study area, with the aim of establishing optimum densities for root Production. Two local clones (white and red-skinned) and four improved clones (8010, 8017, 8034 and 8061) were planted at densities of 6666, 10 000 and 20 000 plants/ha. The trials were repeated three times during 1982-85. Number and yield of fresh storage roots increased with higher densities but there was a corresponding decrease in numbers of roots per plant and percentage of marketable root yield. Local Red and 8010 had optimal root yield at 10 000 plants/ha, with 18.1 and 13.4 t/ha respectively. Best yields of Local White, 8017, 8034 and 8061 clones were at 6666 plants/ha, with 15.4, 37.1 and 31.8 t/ha, respectively. Local Red and 8010 clones are tall with fewer branches; at 10 000 plants/ha, they produced a dense canopy that covered the soil but permitted access for other field work. Local White, 8017, 8034 and 8061 are short and branch profusely. A dense canopy covering the ground and allowing access for work was produced at 6666 plants/ha. Clonal growth habits determine crop stands per hectare, particularly in terms of their aerial morphology.

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Sprouting ministem cuttings without soil: A new technique for rapid multiplication of cassava.

J.A. Otoo

Using soil to sprout ministem cuttings of cassava (*Manihot escutenta*) during rapid multiplication presents problem so high cost, technical inconvenience and the risk of disease infection. In this paper, an alternative technique is described which avoids the use of soil for sprouting the ministem cuttings. The advantages and possible uses of the technique are discussed.

LA. Nwosu and F.A. Onofeghara

The growth analysis of cassava (*Manihot esculenta* Crantz) under various levels of water stress showed that the relative growth rate of the seedlings decreased under higher and longer stress. This reduced the dry-matter accumulation because of the lowered net assimilation rate of the plant under stress conditions. However, leaf area ratio increased compared to unstressed plants but such increased leafiness was not associated with increased dry-matter content. Stressed seedlings also showed an initial low relative water content. Their shoot and root lengths, growth of eaves, roots and root hairs, bud initiation and sprouting potential were all reduced. The total chlorophyll decreased at higher stress level but protochlorophyllide increased. Flavenol glycosides were high initially, but fell later, while anthocyanins were not markedly affected compared to the control.

H.D. Nsiama-She, H.K. Tata et L. Kapongu

Depuis sa première découverte au Zaïre en 1973 la cochenille de manioc (*Phenacoccus manihoti*) s'est établie en ravageur d'importance nationale. La lutte biologique contre le ravageur est menée avec succès depuis 1982. En 1987 et 1988, une évaluation s'est faite sur les dégâts causés à la culture par la cochenille. Les dégâts se sont révélés négligeables, importants et très sévères dans les zones où la lutte biologique avait été menée respectivement depuis longtemps, récemment ou pas du tout.

Predation of cassava green mite by exotic and indigenous predatory mites in Namulonge, Uganda: Preliminary studies

B. Odongo and J. Orono

Exotic predatory mites (*Neuseulus anonymous* and *N. idaeus*) were placed on leaves of field cassava (*Manihot esculenta*) infected with cassava green mite (CGM). A significantly lower numbers of CGM actives were recorded 3 months after treatment on protected plants than on unprotected control plants. Fewer CGM were also obtained at other dates from plants treated with the beneficial mites than from the control. Damage symptoms were significantly lower on protected than on control plants. More beneficial mites were recorded in the release fields than on plants in fields in which the mites were not released. This paper discusses the distribution of the combined exotic and indigenous mites relative to the abundance of their hosts.

Effect of mosaic virus on growth and yield of cassava in western Uganda

G.W. Otim-Nape, A.F. Kintukwonka, C. Nwesigye and W. E. Emokol

The effects of African cassava mosaic virus (ACMV) in the Masindi, Hoima and Kasese districts of western Uganda were studied in a field survey. Samples of each cassava (*Manihot esculenta*) variety in the three districts were assessed for plant height, total plant weight, total Root number, root yield and average root weight, harvest index and whitefly population on each Cassava plant with ACMV on a 0-5 scale. A total of 13 cassava varieties were observed which had high ACMV incidence and severity. The varieties were tall, medium to high branching, with sweet or bitter roots and yields of 2.0-13.5 t/ha. ACMV, green mite and root knot nematodes significantly reduced yields in the area, but growth and yield of cassava were similar across districts and counties, regional spread accounting for only 2-8% of the variations observed on plant growth and yield. ACMV was not significantly correlated with the whitefly population on cassava but greater numbers of whiteflies exacerbated ACMV infection. ACMV significantly reduced plant weight, the number, weight and yield of roots and the harvest index. The response of plants to ACMV varied significantly with severity of the virus. The root yield losses resulting from ACMV were 70-80, 80-90 and 70-98% in the Masindi, Hoima and Kasese districts, respectively.

Effet de la récolte des feuilles de manioc Sur l'épidémiologie de la bactériose et le rendement en racines tubéreuses

D. Lutete. G. Muyolo et N. Mahungu

La récolte des feuilles de manioc (*Manihot esculenta*) est une pratique journalière au Zaïre au les feuilles tendres des extrémités des tiges constituent un légume important très consommé par la majorité de la population du pays. Ce légume constitue en effet une source financière importante pour les planteurs en général et les maraîchers urbains en particulier. L'effet de cette pratique sur l'épidémiologie de la mosaïque et de la bactériose et sur le rendement en racines tubéreuses était étudié. La pratique favorise l'expression de la mosaïque et de la bactériose. Une association positive est trouvée dans l'expression des deux maladies en fonction de la fréquence de la récolte des feuilles. En outre, cette pratique réduit le rendement en racines tubéreuses par 49, 2% en comparant le témoin (zéro récolte) à des sujets ayant subi 3 récoltes.

Les maladies racinaires du manioc: distribution, importance, écologie et modes d'infection des tubercules

C. Makambila

Les maladies racinaires représentent en Afrique Centrale, un groupe de maladies peu connues Scientifiquement, mais très répandues au Tchad, au Gabon, en Centrafrique, au Cameroun et au Congo, dans les plantations de manioc (*Manihot esculenta*) installées dans les ecosystems forestiers. Les agents pathogènes responsables sont des champignons telluriques. Ce sont *Armillaria* sp., *Sphaerostilbe repens* et *Phaseolus manihotis*. L'étude écologique de ces agents pathogènes a permis de mettre en évidence une relation entre leur distribution et le complexe sol, végétation et humidité relative du sol. *Armillaria* sp. est présent en forêt dense et sur sols argileux humides. *Phaseolus manihotis* est présent sur sols sablonneux mais peu humides. Trois modes d'infection des racines du manioc ont été décrits. Les travaux actuels entrepris au laboratoire de Phytopathologie sont axés sur la réalisation des tests de comportement de quelques variétés améliorées vis-à-vis de ces agents pathogènes.

T. Amusa T. Ikotun and S.K. Hahn

The sources of inoculum of *Xanthomonas campestris* pv. *manihotis* in a field fallowed for 1 year under mucuna were found to be the old infected debris left over from the previous season's planting, the plastic mulch material and the soil. This study showed that for the three sources of inoculum, the bacterial population was high in the rainy season and low in the dry months. Population density was highest in the plastic mulch and lowest in infected plant debris. The plant debris, being organic matter, was continuously being degraded by saprophytes, as a result of which cells of the bacterium were released into the soil. Thus, the population per gram of the organism for each gram of plant debris was much lower than that of the soil. These results stress the importance of plant debris in the epidemiology of cassava bacterial blight disease in a new plantation. After harvesting, infected plant debris and infected plastic mulch should be collected together and burnt, and the soil should be turned over and left fallow. All cassava plants should be harvested about the same time to create discontinuity in the presence of the bacterium in the environment.

M. Bokanga

A survey of traditional cassava (*Manihot esculenta*) processing techniques in Zaire found that fermentation is used in almost all techniques. This paper describes the role of fermentation in detoxifying, prolonging the shelf-life and imparting typical flavors to processed cassava products. The fermentation process also facilitates other processing steps such as drying and milling. The role of fermentation in the industrialization of cassava food production is discussed.

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Transformations traditionnelles, formes de consommation et de commercialisation du manioc en milieu rural Congolais

J. Massamba et S. Treche

Une enquête nationale sur les modalités d'utilisadon du manioc (*Manihot esculenta*) en milieu rural a été menée de juillet à septembre 1989 en République Populaire du Congo. Les premières analyses des données recueillies permettent de préciser: les fréquences et les modalités de Consommation des différentes formes tradidonnelles au Congo; les fréquences avec lesquelles différentes transformations tradidonnelles sont effectuées dans les ménages et les facteurs influencant leur réalisation; la part des récoltes destinée à être commereialisée et la nature des formes de commercialisation.

J. Mabanza

Au Congo les industries qui s'installent sur le manioc (*Manihot esculenta*) sont essentiellement des industries de transformation pour obtenir des produits secs (*foufou*) et produits humides (*chicouangeu*). Le complexe Agro-Industriel d'Etat de Mantsoumba fait la culture du manioc, et le transforme en *foufou* avec une production mensuelle de 156 t en 1988. De nombreux autres inventeurs privés s'intéressent à la mise au point de machines de fabrication de la chicouangue qui est produite et vendue à Brazzaville. On observe de plus en plus des particuliers qui s'intéressent aussi au traitement mécanique et au conditionnement du *saka saka*, une autre denrée alimentaire à base de feuilles de manioc. Cet engouement pour la transformation industrielle du manioc permettra une amélioration sensible de la production.

M.E. Oti and L.S.O. Ene

Indigenous low-cyanide cassava (*Manihot esculenta* Crantz) varieties have low yields and are susceptible to pests and diseases. Improvement efforts at the National Root Crops Research Institute (NRCRI) at Umudike, Nigeria have produced five varieties with low cyanide and a yield of over 20 t/ha. The International Institute of Tropical Agriculture (IITA) has also developed a high-yielding and low-cyanide cultivar, TMS 4(2)1425. Increased resistance to African cassava mosaic virus (ACMV) has been achieved at NRCRI. The low-cyanide cassava cultivars produced at Umudike are being tested in northern Nigeria under improved agronomic practices but the problem of damage caused to low-cyanide cassava by rodents, birds and monkeys has not been solved. It is recommended that low-cyanide cassava be planted from the Middle Belt to northern Nigeria where damage to cassava by rodents and birds is minimal. Farmers are being encouraged to grow the high-yielding, high-cyanide, pest- and disease- resistant cultivars in the rainforest zone of Nigeria as well as to process the root adequately before consumption.

Critical control points in the commercial production of high-quality gari

M.O. Sanni

This paper describes an ideal process flow chart showing a maximum of 13 Critical Control Points (CCP) in the commercial production of high-quality gari. The CCP, critical processes (raw material control, process time and control, equipment and personnel hygiene and environment control) and associated physical, chemical and microbiological hazards were identified. Using the International Institute of Tropical Agriculture (IITA) improved cassava (*Manihot esculenta* Crantz) variety TMS 30572, the CCP were investigated. Washing the roots before and after peeling reduced the mycoflora of gari by over 50%. The pH of gari decreased from 4.55 to 4.13 during a 6-day fermentation period. The total hydrogen cyanide (HCN) content of the dewatered mash decreased over time from 5.0 to 2.1 mg/100 g sample in 5 days. Roasting further reduced the HCN content of gari from 2.4 to 0.7 mg/100 g for the same period. The water activity of 21 gari samples produced under commercial conditions varied from 0.35 to 0.72. The production of a high-quality gari is possible by a strict monitoring of the CCP, particularly washing, fermentation and roasting.

E C. Okafor and P.S.N. Onyekwere

This paper describes a low-cost *gari* fryer designed at the National Root Crops Research Institute (NCRI) in Nigeria and made from readily available raw materials. The heating chamber (furnace) is made of fire clay and has a chimney that lets out the smoke during frying. This improved manual fryer's capacity is 8.34kg/hour, compared with 3.6kg/hour for the local fryer. In the improved gari fryer the rate of moisture evaporation is 1.76 g/second, compared with 0.40 g/second for the local fryer. The design and construction of the heating chamber ensures fuel economy, heat conservation, efficient utilization with low heat transfer through the heating chamber walls, and more comfortable conditions for the operator.

Development of cassava processing and preservation facilities in Liberia

A.F. Tubman

Liberians have traditionally relied heavily on rice as a food staple. Because of the need to import much of this product it has been proposed to try to encourage Liberians to increase their cassava (*Manihot esculenta*) consumption. To accomplish this, farmers must produce more cassava and a greater amount must be processed into gari. This paper proposes that extension organizations should work actively with farmers to increase their use of new cassava varieties in order to increase cassava production as well as setting up gari-processing centers. It is estimated that at 100% capacity, such centers could process up to 432 t of gari per year. The plant investment cost for such a center would be about L\$30 000, which would produce a gross profit of about L\$60 000 per year.

Estimate of the impact of a new cassava variety on farm income

C. Bartlett, K. Kazumba and S. Lianabo.

The impact on farm incomes of a new variety of cassava (*Manihot esculenta*) was estimated by tracing the spread of the cuttings distributed over several years from the research station to farmers. Estimates were then made of the rates of multiplication in the fields in order to arrive at the present area of the variety grown by farmers. From this figure, estimates were made of the total benefits to farmers as a result of planting this variety. Projections were made of future increases in planting the variety from the basis of cuttings already in farmers' fields. These projections were based on the estimated areas of the variety each farmer was likely to plant and on the rates of diffusion for the variety between farmers. Good rates of return on investment in cassava research appear to have been achieved and this paper suggests measures to increase it.

On-farm evaluation of selected cassava clones in Liberia

M.A. Saqui, D.D. Wounuah and A.S. Laveleh

Four cassava (*Manihot esculenta* Crantz) clones (25, 15, 56 and 31) selected by the Central Agricultural Research Institute (CARI) and a local cultivar were evaluated on traditional farms in six locations. Clones 25 and 56 performed significantly better than the others in two of the six locations. Mean root yield of clone 25 (24.42 t/ha) across locations out yielded the local cultivar (8.55 t/ha). However, the ranking of clones varied across locations. Except for clone 31, all CARI clones yielded more than the local one. Taste assessment by farmers ranked clones 25 and 56 to be first and second, respectively.

Résultats préliminaires de l'essai d'adaptation des variétés de manioc aux conditions de haute altitude de la zone du projet Kigali-Nord au Rwanda

J. Mulindangabo, D. Rollin et Ph. Ntawuruhunga

Le présent essai avait pour objectif de vérifier l'adaptation des variétés de manioc (*Manihot esculenta*) issues du programme d'amélioration de l'Institut des Sciences Agronomiques du Rwanda (ISAR) aux conditions écologiques de la région d'altitude de la zone du projet Kigali- Nord. Les résultats des rendements montrent qu'il est possible de cultiver le manioc jusqu'à 2000 m d'altitude et d'obtenir des rendements acceptable à partir du quinzième mois. La récolte du manioc à 24 mois donne des rendements intéressants surtout pour les variétés Créolina et Mulundi. Cet essai a permis au projet Kigali-Nord d'avoir un matériel végétal adapté à sa zone d'action. Ce matériel devrait être multiplié et diffusé à grande échelle chez les agriculteurs pour leur permettre d'augmenter leur production de manioc,

Cassava utilization in the poultry industry: The Nigerian perspective

J E Okeke, A.M. Agbakoba and E. Oti

This paper reviews the use of cassava (*Manihot esculenta* Crantz) as cassava root meal (CRM) in broiler production. Low-cyanide CRM for mixing with feed concentrates was prepared by grating fresh roots, dewatering, fermenting for 48 hours sun-drying to 12% moisture level. Feeding trials with cassava-based feeds showed that mixtures of 50-52% CRM and 50-48% concentrates were wholesome for broilers and were comparable with standard concentrates maize feed in terms of weight gain and final live weight. Production costs were lower for broilers raised on CRM-based feeds which were not appreciably different in nutrient and vitamin content from the standard feeds. Cassava production and processing for use in poultry production is advocated as a viable cassava-based development strategy for the rural tropics.

Economics of cassava production under the Structural Adjustment Program in Ghana

S. Asuming-Brempong

The economics of cassava (*Manihot esculenta*) production in Ghana are analyzed using the Domestic Resource Cost (DRC) criterion. Ghana's efficiency in cassava production for food and feed and in cassava processing into gari are discussed. Analysis of cassava production in 1980 before the Structural Adjustment Program (SAP), and subsequently in 1988, indicates that during the SAP, Ghana's comparative advantage in cassava production has improved and promoted gari processing for export.

Industrial demand for cassava in Ghana: Prospects and problems.

R.M. AI-Hassan

Increases in the production of cassava (*Manihot esculenta*) in Ghana, coupled with an improved food supply, have led to a decline in the real prices of cassava, especially at the farm gate. Poor transport infrastructure has compounded the problem as the producing areas are not easily reached. The road problem may soon be solved as improvement programs with the support of international donor agencies have been initiated. The long-term prospects for cassava lie in an expanded demand base. This paper focuses on the potential for cassava uses in the textile industry. Current starch use in the industry is estimated at 418 t a year, which translates to a root demand of only 2717 t. At a production rate of 80% of total capacity, the industry will demand only 0.22% of the 1988 total root production, a quantity too small to threaten availability of cassava for food. However, the industry now relies on imported wheat starch because of lack of knowledge on the use of cassava starch. There is an urgent need for research to determine the appropriate form of cassava starch for the industry and how to produce that starch efficiently and cost effectively.

Production of seed yams by the minisetts technique: Effect of mulch stakes and plant population

0.0. Okoli A.F.K. Kissiedu and J.A. Otoo

The effects of staking and plastic mulching on the yield and quality of seed yams (*Dioscorea* spp.) produced by different populations of transplanted minisetts were studied on the farms of the Crops Research Institute at Fumesua near Kumasi, Ghana, where the soil type is forest Ochrosol. In two experiments, mulching increased yield by over 50% but staking had no significant effect on yield, yield components or stand survival at harvest. The superiority of mulching was expressed in terms of the increase in percentage stand survival at harvest, in yield per stand, in number of tubers per plot, in size of tubers and in the marketable percentage of the crop. The results were similar for plot densities of 40 000 plants/ha and 80 000 plants/ha, except that the latter gave smaller tubers and a lower marketable percentage of the crop. Besides controlling weeds, plastic mulch provided the same effect as staking, resulting in greater seed yam yield of better quality.

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Substitutes for chemicals, sawdust and plastic mulch in improved seed yam production

J.A. Ot00

Techniques for improved seed yam (*Dioscorea spp.*) production usually involve treatment of yam minisetts with chemicals to reduce rotting. Minisetts are then sprouted in a medium of moist sawdust before transplanting in ridges covered with plastic mulch in the field. Some farmers complain of non-availability of chemicals and sawdust and the high cost and/or non-availability of plastic mulch. This paper discusses possible substitutes for these components.

Relative distribution of hormones in yam in relation to uniform sprouting in yam minisetts

X. Ndzana J.G. Wutoh and O.U. Onokpise

The yam (*Dioscorea rotundata*) miniset technology developed by the National Root Crops Research Institute (NRCRI) of Nigeria is a semi-rapid seed yam multiplication system for eliminating constraints imposed by the shortage and high cost of seed yams. The technique has been improved at the International Institute of Tropical Agriculture (IITA) and has been tested by farmers. In spite of the potential advantages of this technique, the variation in the time of sprouting of the minisetts makes it less suitable for commercial yam growing in Cameroon. This study induced uniform sprouting on the various parts of the yam with synthetic growth regulators. Results show that the mid-region of yam tubers provides the best sprouting rate but hormones used on other sections of the yam could produce adequate sprouting.

Elimination of yam culture contamination using double-surface sterilization

S. Zok, A. Sama and L. Nyochembeng

Progress in yam (*Dioscorea spp.*) tissue culture experiments has been hindered by considerable fungal contamination (80-100%). Experiments involving surface sterilization procedures were therefore carried out to reduce contamination. This required using double-surface sterilization procedure with 8% calcium hypochlorite $\text{Ca}(\text{OCl})_2$ for 10 minutes, followed by 6% $\text{Ca}(\text{OCl})_2$ for 5 minutes before final rinsing in three changes of sterile double-distilled de-ionized water. This technique reduced contamination to 8-10%.

Importance des maladies virales de l'igname au Togo

M Y. Gumedzoe, E. Plante, G. Thottappilly et J.C. Thouvenel

Les contramtes majeures de l'igname au Togo, sont les maladies virales ,souvent observées sur *Dioscorea alata* L.et *D. rotundata* Poir, causées par des potyvirus, et transmises d'une saison à l'autre par les organes de multiplication végétative (tubercules virosés) entraînant souvent des pertes de rendement. Deux de ces maladies virales causées par le *Dioscorea* green banding mosaic virus (DGBMV), le beet mosaic virus-isolate (BtMV-Y) ont été étudiées. Les deux virus ont été identifié par voie sérologique (immunodiffusion dans l'agarose) lors de prospections phytosanitaires à travers les principales régions de production de l'igname au Togo. Les caractéristiques biologiques (symptomatologie sur une gamine de plantes différentielles) et physico-chimiques, de même que les résultats de leurs interactions avec certains cultivars d'igname sont présentés. Un troisième virus de l'igname, le yam mosaic virus (YMV-N) a été également identifié au cours de nos enquêtes phytosanitaires par le test immunoenzymatique ELISA (uniquement) et non par immunodiffusion, dans l'agarose.

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Economics of yam flour production: Implications for research and the promotion of yam-based industries in Nigeria

N.O.A. Ezeh

This paper evaluates the cost effectiveness of an improved technology for processing yams (*Dioscorea* spp.) into flour developed at the National Root Crops Research Institute (NRCRI), Umudike, Nigeria. The processing method, resource inputs and problems encountered are described. The results show that for each tonne of yam tubers the estimated total processing cost, revenue and profit were Naira 4713.37, 8000 and 2386.63, respectively. Thus the venture could yield a profit of 70%. The paper explains the need for policies to promote small-scale enterprises that are technically and economically feasible in Nigeria.

S. Doumbia

Cette étude montre que seules quelques variétés d'igname, dont Krenglè (*Dioscorea cayenensis-rotundata*) est un exemple pour lesquelles existe une réelle demande au niveau du commerce mériteraient d'être cultivées de façon intensive. Cette approche se heurte malgré tout à un certain nombre d'obstacles dus aux aléas climatiques, à la difficulté de sédentarisation de la culture de cette variété peu apte à entrer dans une rotation, et à la nature très fluctuante des prix agricoles. Cet article décrit l'intérêt et les limites d'une telle approche dans la définition d'une politique de modernisation des exploitations agricoles à base d'igname dans la région de Dabakala-Katiola.

J.B.A. Whyte

Ten clones of sweet potato (*Ipomoea batatas*) were evaluated at five locations with different agro-ecological characteristics. The parameters measured included yield (W) and its components, tuber number (X) and weight (Y). Highly significant clone, location and clone x location interactions were obtained, with clones 1611 and 046 producing the highest yields over the five locations. The yields were higher in the high rainfall/lowland evergreen forest zone and the medium rainfall/semi-deciduous forest zone than in the high and medium rainfall savanna zones. The clones reacted differently to increasing altitude, with yields declining at altitudes above 1500 m. At least 9 months growth was required at altitudes of 2000 m for the yield to equal that produced after 4 months at lower elevations. Yield was significantly and positively correlated with X and Y, while X was negatively correlated with Y. All clones except for 1611 had yield stability indices close to 1, a result of yield components which changed with location in compensation. TIS 2544 and 1112 clones were most able to change their X and Y components. The broad sense heritability estimate was highest for the number of tubers (46%) followed by the average tuber weight (16.7%) and yield (6.1%).

M.O. Akoroda H.J. Pfeiffer and R.E. Mbahe

Farmers in Adamaoua province, Cameroon grow sweet potato (*Ipomoea batatas*) on 5-10% of their small holdings, for household use and for cash. The Institute of Agronomic Research (IRA) has released two superior clones, TIB 1 and IRA 1112, derived from breeding materials supplied by the International Institute of Tropical Agriculture (IITA). As the fifth most important food crop, sweet potato supplements food from cassava, maize, yam and sorghum- millet. Efforts to multiply and distribute the improved clones have been successful in many parts of the more heavily populated sectors of the province. Collaboration with the Ministry of Agriculture and other agencies has been crucial to this success. However, problems of over production in some areas and inefficient marketing structures remain, and there is a need to develop new ways to use the tubers other than by consumption in the fresh form. Farmers still need to adopt better management practices in order to maximize labor efficiency.

Interplanting sweet potato with maize in Malawi

R.F.N. Sauti and M.M.M. Soko

Interplanting trials of sweet potato (*Ipomoea batatas*) and maize (*Zea mays*) were carried out at Makoka for four seasons, 1983-87. The sole maize stand out yielded the maize yield from intercrop stands, with or without fertilizer. Sweet potato sole stands with fertilizer out yielded all the treatment combinations (23 t/ha). Combined yields for the fertilized maize-sweet potato intercrop (10 t/ha) exceeded those of sole maize with fertilizer (2.2 t/ha) and maize-sweet potato without fertilizer (9 t/ha).

P.S.N. Onyekwere and E.C. Okafor

Estimating water requirements of crops is a basic need for farm planning, especially for any irrigation project. There are many techniques for measuring the quantity of water a crop requires, including direct and indirect methods. In this study, the water needs of sweet potato (*Ipomoea batatas*) were directly measured by gravimetric soil sampling. The results showed that an average supply of 4500 cu. m/ha is required. This amount of water, distributed weekly, would sustain a yield of more than 20 t/ha of sweet potato in 4 months.

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Assessment of the effects of temperature and light on the growth of sweet potato, using the nutrient film technique

C. Bonsi, P. Lorentan. D. Mortley. W.A. Hill. C. Ogbuehi. E. Martinez and C. Morris

Environmental growth chamber experiments were conducted to investigate the effects of two Photo period and temperature regimes on the growth and storage root yield of two sweet potato (*Ipomea batatas*) cultivars, TI 155 and Georgia Jet (Ga Jet). Vine cuttings of these cultivars were grown hydroponically using the nutrient film technique. The plants were subjected to a 24-hour photoperiod or to a 12-hour photoperiod with the temperature maintained at 28°C or a light/dark temperature of 28/22°C. Light irradiance of 400 $\mu\text{mol}/\text{m}^2/\text{s}$ at canopy level and 70% RH were maintained throughout the growth period. The results showed varietal differences in the plants' response to continuous light. Ga Jet storage root fresh and dry weights and fibrous root dry weights increased under continuous light and constant temperature, whereas those for TI 155 decreased. The storage root yield of sweet potatoes was significantly lower at 28°C constant temperature as opposed to the 28/22°C light/dark temperature regime.

Effects of periodic harvesting of storage roots and shoot tips on growth and yield of sweet potato grown hydroponically

**P.A. Lorentan, C.K. Bonsi, D.G. Mortley, C.R. Ogbuehi
W.A. Hill and C.E. Morris**

Because storage roots and shoot tips of sweet potato (*Ipomoea batatas*) are edible, they could provide food during long-term manned spaced missions for the US National Aeronautics and Space Administration (NASA). Studies were conducted on the effects of periodic harvesting of both shoots and roots on the total yield of the sweet potato plant. Vine cuttings of Georgia Jet (Ga Jet) and TI 155 cultivars were grown in hydroponic film with a modified half-Hoagland nutrient solution of 1:2.4 N: K ratio. Root yields were low (the maximum yield of TI 155 was 1790 g/plant in 130 days). The studies showed that periodic harvesting did not affect total yield of storage roots when compared to the control. Bi-weekly harvests of shoot tips beginning 42 days after planting provided 103.5 g/plant of fresh vegetable greens along with over 400 g/plant of fresh storage roots in 120 days, for Ga Jet. Harvest of Ga Jet roots at 105 days and at the end of the trial gave 432 g/plant compared to 461 g/plant for the control. For TI 155 root yield was similar was 337 g/plant against 343 g/plant for the control. Trials in progress include weekly shoot tip harvests and periodic storage root harvests after 90 days of growth.

Reducing weevil damage in sweet potato, using host-plant resistance and early planting and harvesting

K.M. Lema

A study was conducted on the effect of early planting and harvesting and the use of moderately resistant varieties on damage caused by sweet potato weevils (*Cylas* spp.) to sweet potato (*Ipomoea batatas*) storage roots. The results indicate that early planting and harvesting greatly reduced weevil damage. When sweet potato was planted and harvested late, up to 58.7% of storage roots of the susceptible clone TIB 4 were unmarketable because of weevil damage. For resistant clones, 27.5 and 12.5% of the roots of TIS 2532 and TIS 70357, respectively, which had been planted and harvested late, were unmarketable.

Characterization of cocoyam accessions, using isoelectric focusing

X. Ndzana, O.U. Onokpose and J. Wutoh

Tuber proteins of 28 accessions of cocoyam (*Xanthosoma sagittifolium* (L.) Schott) in Cameroon were separated using the isoelectric focusing (IEF) technique which fractionates and purifies proteins as well as providing a high degree of resolution. Characterization of accessions in this study revealed that tuber protein bands could be classified into two main groups depending on whether proteins migrated to the anodic or cathodic end of the gel. Compared to standard proteins, the isoelectric point (pI) of the main acidic protein band corresponded to that of Trypsin inhibitor, a soybean protein with $pI = 4.55 \pm 0.01$, while pI of the main alkaline protein band corresponded to that of L-lactic dehydrogenase, a commercial standard protein from rabbit muscle with pI of 8.30-8.55.

Acclimatization of cocoyam plantlets derived from tissue culture

J. Wutoh, S. Zok, J.T. Tambong, L. Nyochembeng and O.U. Onokpise

Advances in tissue culture work on cocoyam (*Xanthosoma sagittifolium* (L.) Schott) were impaired by improper acclimatization of newly formed plantlets, resulting in losses of 70-95 % .Acclimatization was studied with four growing media: sterilized and unsterilized soil, and sterilized and unsterilized mixtures of vermiculite and soil (50:50 ratio). With these four media, plantlet survival was 90-100% but there was better growth of petiole length among plantlets acclimatized on unsterilized soil. This indicates that soil sterilization is not essential, which will save considerable material, time and effort in acclimatizing plantlets.

S. Zok, X. Ndzana and J. Wutoh

The traditional methods of propagating cocoyam (*Xanthosoma sagittifolium* L.) by corms, cormels and stem cuttings often result in dissemination of disease and a low rate of multiplication. During growth, cocoyam rhizomes bear cormels and numerous buds in rings. These buds are dormant when sets of rhizomes are planted. This paper reports on a study in which the sprouting of these dormant buds was induced in vitro, using growth regulators. The results showed this to be a reliable and rapid method for the large-scale production of planting material needed for mass propagation of cocoyam.

R.M. Bikomot and J.K. Brecht

Experiments were conducted to identify the effects of post-harvest treatments on the storage quality of cocoyam (*Xanthosoma* spp.) corms. Curing at both 30 and 35°C with 95-100% relative humidity was most effective in reducing weight loss and in reducing decay from *Erwinia carotovora* and *E.chrysanthemi*. Immersing corms in 1% sodium hypochlorite (NaOCl) solution for 2-3 minutes prior to storage did not control decay. Combining immersion in NaOCl with curing improved corm appearance and reduced weight loss and decay. Satisfactory weight loss, less decay and good sprouting were obtained over 4 weeks of ambient storage when corms were packed in perforated plastic bags or burlap bags. Considerable weight loss and shrivelling occurred among unpacked corms and those in mesh bags. Non-perforated plastic bags increased decay and sprouting. The best-quality corms were obtained when packed in perforated plastic bags after curing at 30°C and immersion in NaOCl.

O.P. Ifenkwe

Studies conducted in the 1987-88 and 1988-89 dry seasons on potato-wheat intercrops found that planting potato (*Solanum tuberosum* L.) on the crest of ridges, with wheat on the side, reduced potato yields but increased the grain yield. In both years, sole wheat gave a higher net return than sole potato but this may be an effect of the high price of wheat. In the 1988-89 dry season, intercropping of potato and wheat caused a 15-32% increase in the efficiency of land utilization. Best results were obtained from intercropping potato on the crest and wheat in the furrow or from setting them on alternate ridges. However, wheat should be planted 3 weeks after potato to optimize the net income from the intercrop system. Of the four levels of N and P used on the intercrop, applications over 75 kg/ha did not significantly increase the yield of either crop, indicating the adequacy of that level of fertilizer under irrigation conditions on the Jos Plateau of Nigeria.

B.A. Aighewi and S.N. Lyonga

After potato (*Solanum-tuberosum* L.) was introduced to Cameroon in the 1940s, it gained importance as a cash crop. The ecology of the Western Highlands favors potato production, mainly at 800-2000 m a.s.l. Traditional methods of cultivation give low yields because farmers lack information on improved agronomic practices. Storage is poor and inadequate marketing structures cause seasonal variations in supply and prices. There is a need to study ways of improving potato production, storage, handling, processing and marketing in Cameroon.

Effet de l'hypochlorite de sodium et de quatre modes d'entreposage sur le comportement des pommes de terre à Dschang, Cameroun

S. Nzietchueng et F. Tchio

L'effet de quatre modes d'entreposage (sol de chambre, fosses tapissées de feuilles sèches, emballage en jute et lumière diffuse) et de l'hypochlorite de sodium (NaOCl) sur le comportement des pommes de terre (*Solanum tuberosum* L.) a été examiné à Dschang au Cameroun. Les résultats ont montré que les tubercules stockés perdent de 2,78 à 4,61% de leur poids en eau selon le mode de stockage. Une interaction bénéfique pour le contrôle des pourritures a été mise en évidence entre les concentrations utilisées de chlore (125 ppm et 250 ppm) et les fosses. Ce genre de traitement, par contre, accroît les pertes en eau, quel que soit le mode de stockage. Les pertes globales varient de 4,8% (lumière diffuse) à 12,5% (tubercules étalés sur le sol). La combinaison fosse-chlorination (125 ppm) est préconisée pour le stockage des pommes de terre de consommation.