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Temperature effects on leaf growth of cassava (*Manihot esculenta* Crantz) in controlled environments

S.O. Akparobi, A.O. Togun & I.J. Ekanayake

ABSTRACT

The leaf is the site of photosynthetic activities and crop productivity is controlled by the sizes and efficiency of leaves. Leaf development in cassava can be dependent on genetic make up of the plant and it is sensitive to temperature. The aim of this study was to quantify the relationships between varying low temperature regimes (32/22°C, 25/20°C, 20/15°C, and 15/10°C, day/night temperature respectively) and development of leaf area in eight cassava clones (TMS 30555, TMS 91934, TMS 4(2) 1425, TMS 30001, TMS 30572, Danduala, Danwaru and TME 1). Results showed that leaf initiation took about 10, 13 and 17 days at 32/22°C, 25/20°C, and 20/15°C respectively, while none of the clone had leaf initiation at 15/10°C. The young leaves completely opened 6, 10 and 13 days after leaf initiation under 32/22°C, 25/20°C and 20/15°C respectively. The optimum temperature for leaf expansion was 32/22°C. The leaf expansion continued for 20, 27 and 33 days after appearance at 32/22°C, 25/20°C, and 20/15°C respectively. The leaves were significantly different ($P < 0.05$) in mature leaf sizes, and plants at 32/22°C had the largest leaf sizes and also highest total leaf area when compared to other temperature regimes. Significant clonal differences in time of leaf initiation, time for leaf to unfold, days to full expansion, mature leaf sizes and total leaf area were observed. TME 1 and TMS 30572 had the shortest time to leaf initiation and time to unfold. Also, TMS 30572 and TME 1 had larger leaf areas than the other clones in temperature combinations. The total biomass accumulation and growth rates were temperature sensitive and closely related to leaf growth among the clones tested. The results showed that total biological yield of cassava are dependent on the plant's photosynthetic capacity. Early leaf initiation and short time to leaf unfolding may be favorable attributes for improving cassava tolerance to low temperatures.

Key words: altitude, biological yield, clone, leaf area, low temperature

Pages 4-7

Control of *Meloidogyne* infestation of seedyams with Vydate L Dip.

F.I. Onyenobi

ABSTRACT

The germination potentials of root-knot infested seedyams (100-150 g) treated with Vydate L. by dipping for 2 h. at 500-4,000 μg a.i. per ml were not significantly ($P > 0.05$) affected, but showed more vigorous growth of vines and canopy than the untreated plants though phytotoxicity was observed on plants treated at 4,000 μg a.i. per ml. The total weight of yam tuber yield from seedyams treated at 500 μg a.i. per ml was highly significant ($P < 0.001$) followed by treatment at 1,000 and 2,000 μg a.i. per ml ($P < 0.05$). Dipping treatment at 500 μg a.i. per ml for 2 h and at 3,000-4,000 μg a.i. per ml for 1 h, resulted in tuber weight yield which was significantly different ($P > 0.05$) from the untreated control. Gall-free yam tuber yields were highly significant ($P < 0.001$) at treatments of 1,000-4,000 μg a.i. per ml followed by treatment at 500 μg a.i. per ml ($P < 0.01$) when compared with the untreated yam tubers. After harvest, the final soil population of *Meloidogyne incognita* J2 and infectivity bioassay test results was both significantly lower ($P > 0.05$) at 1,000-4,000 μg a.i. per ml treatments. J2 = Juveniles OR migratory larvae of *Meloidogyne* spp.

Key words: root-knot nematodes, *Dioscorea rotundata*

Pages 7-10

Field performance of improved and local sweetpotato genotypes as influenced by growing environments and weevil infestation in Cameroon

J.M. Ngeve

ABSTRACT

The field performance of sweetpotato genotypes was studied at three sites in the forest region of Cameroon. Across sites, clone 048 produced the highest storage root yields (about 22.4 t/ha), followed by clone 1112 (18.5 t/ha). Root yields were twice as high in Nyombe as in the other sites. The wet season crop produced higher yields (28% more) than the dry season crop. Marketable yields, as well as root counts and root sizes were also higher in the wet season than in the dry season crop. Weevil damage to storage roots was higher in the dry season (by 61%) than in the wet season. Stability methods differed in identifying stable clones, and differed in ranking clones depending on the trait measured. However, both Eberhart-Russell and Shukia stability methods rated clones 048, Tib 1, 1602, 1639, 002, and Njombe as stable for root yields. The relationship between weevil tolerance and cultivar adaptability was not consistent. This study shows that the main sweetpotato crop should be grown during the first cropping season when there is abundant moisture for slip sprouting and establishment and when there is little soil cracking to facilitate weevil infestation. The study suggests that since root yields are adversely affected by weevil damage, weevil control measures should be seriously considered in commercial sweetpotato production. Lastly, it suggests that since fewer clones had high levels of tolerance to weevils, further research is necessary in breeding for resistance to weevils.

Key words: yield stability, sweetpotato weevil, *Cylas* spp., Cameroon

Pages 10-14

Household of food consumption patterns in Cameroon with particular reference to roots and tubers

F.A. Numfor, O.B. Okezie & C.H. Proctor

ABSTRACT

A survey was carried out in four of Cameroon's major root and tuber crop producing provinces to determine their role in household food consumption patterns. The results showed that foods root and tuber crops constituted about 60% of the diets and took up about 43% of the household food money. A lower level of consumption (56%) was found in a major urban area of the region and was associated with higher level of schooling by household members and higher household incomes. The consumption of high carbohydrate foods, which include the roots and tubers, was directly linked to production amounts while the consumption of high protein foods was related more to household income.

Key words: diets, food patterns, Cameroon

Pages 14-19

Impact of agroecology on soil fertility status and cassava yield in Nigeria: 1. nutrient levels in soils growing cassava

C.L.A Asadu and F.I. Nweke

ABSTRACT

The soils of major cassava-growing areas of Nigeria were sampled at 0-20 and 20-40 depths in 1991. The objectives were to compare the nutrient levels in both cassava fields and other arable crop fields and relates their nutrient levels to possible factors that affect them. Approximately 470 samples (one half from each depth) were collected from the 65 villages covered in the study and analysed for 16 physico-chemical properties. Sand was the dominant particle size followed by clay in all the soils. Climate was the most important factor that related to the soil properties. The soils of the non-humid climate zone was the most fertile followed by those of the sub-humid zone. Soils grown to cassava mixtures were generally the same and also similar to those grown to other arables in most nutrients except total N which was higher in soils grown to cassava. Thus the soils grown to cassava were not marginal in terms of nutrient levels when compared to other arable fields even though the overall nutrient rating in all the soils was either low or medium for most of the nutrients. This suggests that relative to arable crops considered, including yam and maize, cassava was no longer grown in relatively poorer soils in the country.

Key words: soil nutrients, cassava, arable, marginal, Nigeria

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Impact of agroecology on soil fertility status and cassava yield in Nigeria: II. Contributions of soil properties to cassava yield variations

C.L.A Asadu and F.I. Nweke

ABSTRACT

Cassava yields obtained from farmers' fields in Nigeria during the Collaborative Study of Cassava in Africa (COSCA) survey gave an average root yield of 14.5 t/ha and an average harvest index of about 0.56. The average root yields from both the sub humid and nonhumid zones were the same but significantly higher than that obtained from the humid zone. The soil properties which showed significant correlation with cassava yield parameters were sand, silt, clay, exchangeable Mn and Na, available P and OM as well as Mg:K and Mn:P ratios and exchangeable sodium percentage (ESP). Seven properties that contributed most to root yield variations were OM, pH, sand, exchangeable Ca, Mg, and Mn, as well as ESP. The total variation accounted for by the soil variables was only 10% out of which Mn accounted for the highest proportion of about 3%. The overall contributions to other yield parameters were also low ranging from about 5% in shoot yield variation through about 10% in harvest index to about 12% in stand density. The overall low contribution was attributed to other environmental factors which influence cassava performance thus indicating that factors other than soil properties such as farmers' practices and climatic elements are also important determinants of cassava yield. Furthermore it was also see that nutrient ratios also made important contributions to cassava yield variations.

Key words: soil nutrients, cassava yield, farmers' fields, Nigeria

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Productivity of cassava as influenced by time of intercropping cassava with rice in Sierra Leone: 1. Leaf production and yield

A Jalloh & M.T. Dahniya

ABSTRACT

A cassava/rice intercropping field trial was conducted at Njala in Sierra Leone during the 1990/91 cropping season and repeated during the 1993/94 cropping season. During the 1990/91 cropping season, an improved cassava variety and a local cassava variety were each intercropped with rice at four different sequences: the same date, 2, 4 and 6 weeks after planting cassava. During the 1993/94 season only the improved cassava variety was intercropped with rice on the same date and then 4 and 8 weeks after planting.

Destructive sampling of five plants per plot was done bimonthly starting at 2 months after planting. The plants were detopped at about 20 cm below the apex. The results showed that in the 1990/91 season, the improved cassava variety had a wider canopy and higher number of leaves than the local variety and for both varieties optimum leaf number was produced at 6 months after planting. During the two cropping seasons, canopy width, leaf area, leaf number, leaf area index, and leaf yield of intercropped cassava were adversely affected when cassava and rice were intercropped on the same date. There was a significant improvement in these characters when rice was intercropped with 4 week old cassava. Cassava intercropped with rice at either 4 or 8 WAP produced similar leaf yield like sole cassava. However, sole cassava produced its highest fresh leaf yield at 6 MAP while all intercropped cassava had their highest fresh leaf yield at 12 MAP.

Key words: intercropping, cassava, rice, planting, leaf

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Productivity of cassava as influenced by time of intercropping cassava with rice in Sierra Leone: 2. Root development and yield

A Jalloh & M.T. Dahniya

ABSTRACT

Cassava and rice were intercropped in a field at Njala in Sierra Leone during two cropping seasons. During the 1990/91 cropping season an improved cassava variety with a relatively wider canopy and a local cassava variety were grown separately at a plant population of 10.000 plants per hectare and intercropped with rice at four different sequences: on the same date, and then 2, 4, and 6 weeks after planting cassava. During the 1993/94 cropping season, the improved cassava variety was grown at a plant population of 6666 plants/ha and intercropped with rice on the same date 4 and 8 weeks after planting (WAP). The improved cassava variety out yielded the local variety. Cassava intercropped with rice on the same date produced the lowest number of roots per plant. Delaying the introduction of rice by 4 or 8 weeks after planting resulted in intercropped cassava producing similar root number as sole cassava. At 2 months after planting (MAP), all roots were under 1 cm in diameter. Cassava intercropped with rice at 4 WAP, like sole cassava, already had marketable roots at 4 MAP. At 6 MAP, at least 50% of the roots were marketable. The roots had grown up to 9 cm in diameter at 12 MAP, but the majority of the roots were between 3 and 5 cm in diameter. Total fresh and dry root yield of cassava intercropped with rice at either 4 or 8 WAP was similar to that of sole cassava. Land equivalent ratio (LER) indicates that intercropping with 4 weeks old cassava is most beneficial.

Key words: cassava, rice, intercropping, root, yield

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Metabolisable energy of some improved cassava cultivars for broiler chicken

L.N. Agwunobi & J.E. Okeke

ABSTRACT

The metabolisable energy of nineteen improved cassava cultivars, TMS 4488, NR 8083, TMS 4(2) 1425, TMS 5814, TMS 1095 – D, TMS 4092, NR 8082, TMS 518, TMS 4088, NR 83107, TMS 4080, TMS 30337, TMS 30040, NR 8212, TMS 30572, TMS 91934, TMS 4492, TMS 50395, and NR 41044 were determined and compared using maize variety TZSR-W (Kano White) as a control. Twelve weeks-old broiler chicken, Anak strain, totaling eighty were used for the Apparent Metabolisable energy (AME) determination. Also the chemical compositions of the cassava cultivars were compared. The result showed that the apparent metabolisable energy of the improved cassava cultivars did not differ significantly ($P > 0.05$) from one another but were significantly less ($P < 0.05$) than that of the maize variety. Apart from slight variations in the chemical composition owing to differences in moisture content, the cassava cultivars have similar proximate composition. The similarity in AME and chemical composition among the cultivars tend to indicate that the feed quality of cassava has not been significantly affected by improving cassava cultivars.

Key words: apparent metabolisable energy, cassava cultivars

Pages 37-42

An analysis of the growth and yield of cocoyam *Xanthosoma* spp. under different levels of defoliation

Regina Sagoe & Agnes Ankomah

ABSTRACT

A 2-year field study in the Forest zone of Ghana was undertaken in 1994-1995 to study the growth and yield of cocoyam (*Xanthosoma* spp. [L] Schott) under different levels of defoliation. The treatment consisted of 3 levels of time to first leaf removal (8, 16 and 24 weeks after planting – WAP) and 4 levels of defoliation (0, 2, 3 and 4 weekly intervals). Maximum shoot growth was highest in control which reached its peak at 16 weeks after planting. Plant vigour was most reduced when defoliation started at 8 WAP. Shoot yield varied considerably with defoliation, time to first leaf removal and location or year. The highest reduction in percent leaf and petiole dry weights of 48.9 and 50.9 respectively, were achieved at 2 weekly intervals of defoliation and the lowest percent reduction of 7.5 and 7.2 respectively, for the same experiment was at 3 weekly intervals. When defoliation is imposed as early as 16 WAP, the crop show ability to regenerate. Corm size was significantly correlated with the cormel size and thus the cormel yield. Treatments with bigger corm size therefore had greater number of cormels per unit area and subsequently a higher cormel yield.

Key words: defoliation, time to first leaf removal, shoot yield index (S), root yield index (R), weeks after planting (WAP)

Pages 43-46

The place of cassava in causal relationships in sub-Saharan agriculture

A.A. Tijani & O. Ajobo

ABSTRACT

The existence or otherwise of causality (unidirectional or bidirectional) between hectarage and production in cassava agriculture is examined for six sub-Saharan African countries using time series data from the Food and Agriculture Organization of United Nations (FAO) for the period 1951-1993. The results of the Granger causality tests indicate that causality exists in cassava agriculture but its direction varies from country to country.

Key words: cassava, hectarage, production, causality, optimum lag, length, final prediction error, order of integration

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Opportunities and uses of genetic diversity of root and tuber crops in Cameroon

J.M. Ngeve

ABSTRACT

The main tuber crops grown in Cameroon are cassava (*Manihot esculenta*), yams (*Dioscorea* spp.), cocoyam (*Xanthosoma sagittifolium* and *Colocasia esculenta*), sweet potato (*Ipomoea batatas*) and English potato (*Solanum tuberosum*). There is broad diversity in each of these crops which could be exploited for nearly any use. This paper reviews this genetic potential and shows how selection and genetic progress of root crops depends on the existing diversity. It suggests ways by which the hurdles of genetic erosion could be prevented. The role of genetic diversity in cultivar development, disease and pest resistance, cyanogenic potential and biotechnology is examined for cassava. For cocoyams, the possibilities of genetic diversity through wild cocoyam relatives and from mutagenesis in seeking resistance to the root rot disease is reported, and for yams, the use of steroidal compounds (saponins, sapogenins and diosgenins) from non-edible *Dioscorea* spp. is mentioned as a possible tool for the pharmaceutical industry. The extent of genetic diversity in sweet potato is examined in light of root traits and the resistance to viruses, nematodes and soil insects. Finally, the importance of using tissue culture in preserving large stocks of improved root crop improved root crop germplasm is highlighted as a mechanism for preserving root crops diversity from genetic erosion.

Key words: genetic potential, cultivar development, genetic diversity

