

GRAIN CROP AND PRODUCTS

- NPA 651 Abu, E.A., Onyenekwe, P.C., Ogbadu, G.H. and Olufajo, O.O. (1997). Effect Of Fermentation On Some Mineral Components Of Four Soybeans (*Glycerine max(L)men*) Cultivars. **Proceeding Of 28th Annual Nutrition Conference Society**. Pp. 27-31. The zinc content of locust bean , samsoy-2 TKG 1010-2EB and TGM344 increased significantly ($P<0.05$) after fermentation. Only locust bean showed significant increase ($P<0.05$) in phosphorus content by about 75%. The implications of these results on the chemical basis for the substitution of soya bean in Dadawa are discussed.
- NPA 652. Abayomi, A. and Fadayomi,O. (1989). Effect Of Short-Term Storage Conditions On Viability And Seedling Vigour Of Sugarcane Fuzz(Seeds). **Nigerian Journal Of Botany**,Vol.2. Pp. 109-117..
- Results showed that the viability of fuzz varied between 10 and 66% after 12 months of storage under deep freezer conditions, and survival of seedlings obtained from these fuzz varied between 54 and 72% for both years. Viability of the fuzz stored in the refrigerator and 75% in the second year. Viability was completely lost after 8 and 6 months of storage under the ambient room conditions in the first and second years respectively. The ability of fuzz to maintain viability in storage was found to be cultivar dependent.
- NPA 653 Abu, J. D. [2002] Influence Of Modification On The Paste Viscosity And Sorption Characteristics Of Starch From Maize. **Proceedings Of 26th Annual NIFST Conference**. Pp 179-180.
- The study indicated preferences for phosate modified starch because of its longer shelf stability or the oxidized starch for ability to prevent retro gradation and decreased viscosity.
- NPA 654 Achi, O.K. Okereka (1999). Effect Of Processing On The Functional Properties Of Mesquite Seed (*Prosopis africana*) Flour. **Proceeding Of 23rd Annual NIFST Conference**. Pp. 201-203.
- Information on the changes in the functional properties of *prosopis* seeds as influenced by processing is reported.
- NPA 655 Achinwhu, S.C. (1983). Chemical And Nutrient Composition Of Fermented Products From Plant Food. **Nigerian Food Journal. Vol.1. No.1**. Pp. 115-118.

Minerals, ether extract, fibre, crude protein and amino acids were determined before and after fermentation of African oil bean seed (*pentaclethra macrophylla*), creeping melon (*Citrullus vulgaris*), climbing melon (*Colocynthis vulgaris*) and fluted pumpkin (*Telferia occidentalis*). There was a slight increase in the crude protein and ether extract and a slight decrease in the minerals and fibre content of the fermented products. There was not much difference between the amino acid composition of the fermented and the unfermented products except the fluted pumpkin where the composition of the fermented products was slightly lower.

NPA 656 Addo, A.A., Akinola, J.O. and Yusuf. H. (1987). Chemical Composition And Organoleptic Properties Of Biscuits Fortified With Pigeon Pea Flour. **Nigerian Food Journal. Vol.5.** Pp. 24-29.

Pigeon Pea Flour (PPF) was prepared from the seed of pigeon pea (*Cajanus cajan*) accession 3D 8104 (ex IITA). Blends of composite flour containing 25, 35 and 50 percent PPF and wheat flour (WF) on replacement basis were prepared. Biscuits were made from the composite flour mixtures and evaluated organoleptically by a twelve-member panel when fresh. Protein, fat, moisture, ash and fibre contents of the wheat flour, pigeon pea flour and biscuits were determined. Sensory scores of biscuits fortified with PPF revealed acceptability of the product at 25% and 35% replacement levels. At 50% replacement level, texture, colour and flavour scores were significantly lower than WF biscuits. At optimum level (35%) of PPF replacement, there was an 18.9% increase in protein when compared to the 100% wheat flour biscuits.

NPA 657 Adebajo, L.O. (1996). Mould Flora Of Tiger Nut And Detection Of Aflatoxin Production By Selected Strains Of *Aspergillus flavus* And *Aspergillus parasiticus*.

BioScience Research Communications. Vol.8. No.1. Pp. 29-33.

Twenty-one fungal species, mostly toxigenic and belonging to nine genera were isolated from non-disinfected samples of tiger nut (tubers of *Cyperus esculentus* L.). After surface disinfection, only six species were recovered, at substantially, reduced levels. *Aspergillus* accounted for eight of the total number of species species, including *Aspergillus niger*, *A. flavus* and *A. fumigatus* which were the most frequently obtained fungi both before and after surface disinfection. Other dominant species in decreasing order of isolation from the non-infected samples include. *A chevalieri*, *Rhizopus nigricans*, *Penicillium chrysogenum*, *Aspergillus sp*, *Fusarium moniiforme* and *A. ochraceus*.

The ability to produce aflatoxin by ten and seven isolates of *A. flavus* and *parasiticus* respectively, after culturing for 8 days at 28oC on four

different media was investigated. Qualitative fluorescence tests showed that three isolates of *A. flavus* and none of *A. parasiticus* respectively

- NPA 658 Adedire, C.O. Ajayi, T.S. (1996). Assessment Of The Insecticidal Properties Of Some Plant Extracts As Grain Protectants Against The Maize Weevil, *Sitophilus zeamais* Motschulsky. **Nigerian Journal Of Entomology. Vol.13.** Pp. 93-101.

The results indicated that *C. frutescens*, *P. guineense* and *A. melegueta* effectively protected maize grains against weevil attack. All the three plant extracts exhibited fumigant mode of action since they each have a characteristic pungent smell. It appears *P. guineense* and *C. frutescens* acted mainly through the contact mode of action while *A. melegueta* needed to be absorbed through the cuticle or ingested before it can be effective. Only acetone-extracts of *A. cepa*, *C. citrates* and *C. aurantifolia* were the least effective of the plant materials tested while others were moderately effective. Based on weevil perforation index (WPI), the results of this investigation showed that all the plants tested had some insecticidal activity.

- NPA 659 Adejumo, A . O . D . Oradugba , O . B . Ilori, T . A . and Adebisi, J .A [2009] The Performance Evaluation Of A Kitchen Model Cowpea Dehuller . Proceedings Of 3rd International Conference Of WASAE and 9th **International Conference Of NIAE.** pp21—25.

The results showed that the dehulling , cleaning and machine performance efficiencies increased with increasing seed soaking time and auger speed . The highest dehulling , cleaning and machine performance efficiencies of 82% , 82 . 4% and 67 . 6% respectively were achieved at machine speed of 100 rpm and seed soaking time of 7 mins .

- NPA 660 Adelusi, J.O. (1985). Spoilage In Cereal Industries. **Nigerian Food Journal.Vol.2&3 No1 ,2 ,3. NIFST.** Pp. 99-106.

The paper discussed the result of spoilage, factors responsible for spoilage and, agents of spoilage

- NPA 661 Adeniyi, A.M. (1997). Development Of Improved Soybean And Plantain Recipes In Nigeria. **Proceeding Of 28th Annual Conference Nutrition Society Of Nigeria.** Pp. 73-74.

Even though, soyabean and plantain are being used in Nigeria in the form of several recipes, there is the need to develop and utilize more nutritious and cost effective recipes from them. This paper reports on the development of soyabean and plantain recipes, viz (a) Drinks – Soya Kuhun tsamiya, Soya Kunun gyada, soya-ice cream and plantain juice (b) main dishes – soyabean salad, soybean pottage, plantain pottage and plantain surprise, and (c) Snacks – soybean plain cake.

- NPA 662 Adejo, M.O. and Oguntunde, A.O. (1993). Effect Of Foam Stabilizing Agents On Density, Stability And Bubble Size Index Of SoyMilk Foams. **Nigerian Food Journal. Vol.11. Pp.** 109-117.

The density values of the soymilk foams produced decreased as the stabilizer concentrations increased for each of GMD, MDG and SYP with density generally remaining constant after about 10 min of whipping. Foam stability was enhanced as the soymilk and stabilizer concentrations were increased for foams produced using their GMS or MDG but was considerably reduced in the case of foams producing using SYP with increase in soymilk concentration. The bubble size index which is inversely related to stability and concentration of the stabilizing agent was smallest for soymilk foams produced using MDG followed in increasing order by GMS and SYP.

- NPA 663 Aderiye, B.I., Falana, S.O. and Fatile, V.N. [1997] Chemical And Sensory Evaluation Of Fermented Vegetable Milk From Winged Bean/*Psophocarpus tetragonolobus* Seeds.

Bioscience Research Communications. Vol.9. No 4. Pp. 211-215.

The chemical composition and the palatability attributes of a yoghurt-like product obtained from an imittion milk made from winged beans. *Psophocarpus tatragonoiobus*, were examined. The titratable acidity of the vegetable milk increased from 0.52% to 1.3% in the fermented product obtained from 15% inocutum, 15% sugar and 15% milk supplement after 4 days of incubation. A protein enriched vegetable “yoghout” with a p^H of 4.2 was the most acceptable. The protein content of the vegetable milk used for fermentation was 70mg/g.

The role of the sugar supplement and the activities of the fermenting organisms on the quality of the winged been yoghout are discussed.

- NPA 664 Adeoti, A.A. and Marley, P.S. (1995). Myco-flora Associated With Cob-Rots Of Maize In Samaru Zaria Northern Nigeria. **Nigerian Journal Of Botany. Vol.8. Pp.** 57-64.

Investigations were conducted from 1996 to 1990 to monitor various fungi associated with cob rots of maize in samaru, Zaria. From samples collected at various farmers and IAR fields, results show *Fusarium moniliforme* to be dominate. Other fungi isolated included *Aspergillus flavus*, *A. niger*, *curvilaria lunata*, *Helminthosporium sp.* *Botryodiplodia theobromae*, *Macrophomina phaseolina* and *chaetomium spp.* The most common cob rots were *Fusarium* Kernel rot induced by *F. moniliforme*, the black kernel rot induced by *B. theobromae* and *Gibberella* rot induced by *Gibberella zeae*.

- NPA 665 Adeoti, J.S. (1995). Performance Evaluation Of A Modified Bicycle Pedal Operated Grain Mill .
AMA Agricultural Mechanization In Asia, Africa And Latin America. Vol.26. No.4. Pp. 44-48.

A bicycle pedal-operated grain mill for cereals was modified, fabricated and tested with a view towards ameliorating grain milling problem at the village level. It consists of the milling, power transmission and support units. Grinding is achieved by a combination of impact forces between the grain and the rotor, and, further crushing of the grain takes place by the regulated clearance between the rotor and fixed screen rim.

Tests conducted on the prototype, using maize and sorghum varieties, gave an output range of 8.0-13.0 kg/h, and grain loss of 1.2-2.3 percent at flour particle diameter of 1.20-2.42 mm. The resulting data were much influenced by the endurance limit of the operator in pedalling continuously to operate the rotor type and the milling machine parameters. As presently developed, the quality of the resulting flour indicates that the equipment is more applicable to animal feed milling.

- PA 666 Adepegba, A.O. (1999). The Chemical Analysis Of Hibiscus Sabdariffa And Parkia Bioglobosa.
Proceeding Of 23rd Annual NIFST Conference. Pp. 189-190.

The results shows that the seeds of these selected plants have very high protein and high oil which is comparable to other sources of plant protein and oils.

- NPA 667 Adesida, M.A., Agboola, S.D. and Nwagwa, S.C. (1987). A Guide To The Economics Of Inert Atmosphere Storage Of Grains In Nigeria.
NSPRI Technical Report. No. 13. Pp. 93-105.

The rate of return to the maize enterprise ranges from 16.26% to 17.52% and all capital is repaid in five years. For the cowpeas enterprise, the rate of return is between 46-47% and all capital repaid in two years. Given the assumptions made in this study, storage of grains in inert atmosphere silos is a viable enterprise.

- NPA 668 Adesioye, H.O. (1991). The Effect Of Processing And Storage On The Chemical And Sensory Quality Of Conophor Nut.
Nigerian Food Journal. Vol.9. Pp. 33-39.

Conophor nut was chemically analysed and found to contain 53.8% moisture, 23.5% crude protein, 5.0% crude fibre, 2.9% and 47.4% fat. Sensory evaluation of the appearance, flavour, texture and overall acceptability of the frozen nuts showed that there was significant difference in all the quality attributes, over one month frozen storage at 5% level of significance ($P < 0.05$). The shelf life of the traditionally processed nut, which is not more than 3 days, was successfully extended to at least one month through a combination of heat processing, brining, freezing and frozen storage.

- NPA 669 Adesuyi, S.A. (1966). Control Of Rodents In The Groundnut Storage Site In Kano.
NSPRI Technical Report. No.2. Pp. 25-31.

Recommendations to achieve desired results are stated among them is that bait should continue until none is taken again

- NPA 670 Adesuyi, S.A. Cornes, M.A. (1966). An Assessment Of The Efficacy Of Phostoxin For The Control Of Grains Pests In Silos Part 11.
NSPRI Technical Report No.14. Pp. 109-111.

The report shows that it was very effective against insects pests of the maize

- NPA 671 Adesuyi, S.A. (1968). A Survey Of The Moisture Content Of Early Maize During Harvest In The Western State.
NSPRI Technical Report. No.7. Pp. 59-61.

The results shows that early maize is harvested at a very high moisture content. Most samples are between 22% and 25% moisture content

- NPA 672 Adesuyi, S.A. and Cornes, M.A. (1968). Moisture Content Survey Of Palm Kernels At The Time Of Grading In The Western.
NSPRI Technical Report. No.6. Pp. 53-57.

The mean moisture content remained below 9% throughout the survey and highest moisture level were found in May, June and July.

- NPA 673 Adesuyi, S.A. (1968). A Preliminary Trial On Drying Of Seed Maize With Sorbead "w".
NSPRI Technical Report. No.8. Pp. 63-69.

The experiment confirmed that initial calculation that 50% sorbead to maize by weight would be needed to dry maize safely.

- NPA 674 Adesuyi, S.A. (1969). Post-Fumigation Protection Of Maize In Aluminium Silo With One Per Cent Malathion Dust.
NSPRI Technical Report. Pp. 45-48.

1 per cent malathion dust at 10 p.p.m. has been tested as a maize protectant against re-infestation by insects after fumigation.

The effectiveness of the residue of malathion on the maize was tested for sixteen weeks against *Sitophilus zeamais* (Mots.) and *Tribolium castaneum* (Herbst) using bioassay tests.

The silo was inspected, and samples sieved weekly for live insects

The residue was effective against *S.zeamais* for 15 weeks but not against *T. castaneum* after 1-2 weeks.Reinfestation of the maize occurred from the 9th week by *T.castaneum* and *Cryptolestes* sp. but not by *S.zeamais*

- NPA 675 Adesuyi, S.A. (1969). Western State Grain Storage Sites (2nd Progress Report).
NSPRI Technical Report. No.7. Pp. 49-52.

Western State grain storage sites have been inspected to follow progress since 1964. All silos were empty and the reasons for this were discussed with the farmers and representatives of Co-operative Unions. Inefficient handling of the drying and storage equipments and failure of organised marketing were the main factors preventing the use of silos.

- NPA 676 Adesuyi, S.A. and Adeyemi, S.A.O. (1970). A Comparison Of Malathion, Iodofenphos And Bromophos For The Control Of Insect Infestation On Maize In Cribs.
NSPRI Technical Report. No.5. Pp. 39-46

None of the insecticides gave complete control but each was more effective than BHC at 10 ppm when compared with the results of past trials. It is necessary to carry out a further assessment of contamination and taint in food prepared from maize treated with these insecticides and the economy of their application before a recommendation can be made..

NPA 677 Adesuyi, S.A. (1971). Moisture Content And Insect Infestation Survey On Rice From Ibadan Markets.
NSPRI Technical Report. No.6. Pp. 47-50.

The moisture content and insect infestation of rice sold in the markets at Ibadan were determined every fortnight for fifteen months
The rice samples were free of insects throughout the period of the survey.
The moisture was low enough for long-term storage for nine months of the year, from November to July and above the safe moisture content (13 per cent) in August, September and October
No visible mouldness was observed in any of the samples for the fifteen months.

NPA 678 Adesuyi, S.A. (1973). Comparative effectiveness of Iodofenphos, Bromophos, Tetrachlorvinphos and Pirimiphos-mehyl, Dusts for controlling insect infestation of maize stored in cribs.
NSPRI Technical Report No8 P61- 70

Studies were conducted on the effectiveness of a theoretical 20 p.p.m. active ingredient (based on cob weight) of iodofenphos tetrachlorvinphos, bromophos and pirimiphos-methyl dusts for the control of insects on maize cobs stored in cribs. The dosage rates were confirmed by analysis of the insecticides used.
The bromophos 1 per cent dust used had only 11 per cent of the expected active ingredient and proved ineffective at this dosage. The other three insecticides were effective for 8 month in spite of the fact that rapid break down of active ingredient was recorded during the first month when the grain was above 15 per cent in moisture content
Problems encountered in field experiments with insecticide dusts are discussed.

NPA 679 Adesuyi, S.A. (1974). The Appropriate Application Of Insecticides To Farm And Village Level Grain Storage.
NSPRI Technical Report. No.1. Pp. 23-36.

The paper highlights the insects control at village level using traditional methods and chemical methods of cont.

- NPA 680 Adesuyi, S.A. (1982). Field Trials With Permethrin Dust For The Control Of Insect Infestation Of Store Maize In Southern Nigeria.
Journal Of Stored Product Research.Vol. 18 No 3 Pp. 125-130

In trials using cob maize stored in cribs in Nigeria a 1% permethrin dust was effective in preventing insect damage and maintaining the viability of seed grain. A treatment level of 5ppm permethrin gave significant protection from insect damage over a storage period of 8 months for maize harvested in the rainy season (August/September). A treatment level of 2.5ppm permethrin gave similar protection fo 5 months to maize harvested in the dry season (December/January).

- NPA 681 Adetunji, J.F. (1988). A Study Of The Resistance Of Some Sorghum Seed. Cultivars To *Sitophilus oryzae* (L) (Coleoptera:Curculionidae).
Journal Of Stored Products Research Vol.24 No2 .Pp. 67-71.

Experiments were conducted on some Nigerian and Tanzanian sorghum cultivars to determine their resistance to *Sitophilus oryzae* (L.), as indicated by the numbers of adults emerging from similar initial infestations. Further experiments were conducted to determine the differences and consequences of resistance to *S. oryzae* using selected stored sorghum seed cultivars. Differences in the numbers of emergent adults were highly significant ($P < 0.001$) within both Nigerian and Tazanian cultivars. Almost 2.5 times more adults emerged from the most susceptible Nigerian vultivar (CSH5) than from the least susceptible (FDI). Similarly 15.3 times more adults emerged from the most susceptible Tanzanian cultivar (non-preference) and great mortality of larvae in seeds (antibiosis). The two forms of resistant were associated since the number of eggs laid on different cultivars was significantly correlated with larval mortally in the ($r = 0.73, p < 0.02$). Development periods were significantly longer in resistant than in susceptible cultivars. There was a significant positive linear relationship between developmental periods and larval mortally due to antibiosis.

- NPA 682 Adeyemi, I.A., Fagade, S.O., Ayotade, K.A. (1986). Some Physico-Chemical And Cooking Qualities Of Nigeria Rice Varieties.
Nigerian Food Journal. Vol.4. Pp. 26-33

Chemical quality characteristics of milled samples of ten rice varieties were evaluated amyclose content, gel consistency, alkali spreading value gelatinization temperature and peack viscosity ranged from 25 to 28.9%, 25 to 59mm, 3.0 to 7.0, 66°C to 74°C, 620 B.U. to 1,005 B.U. respectively. Physical characteristics of breakage, degrees of milling and

parboiling, apparent water absorption and swelling capacity of parboiled and cooked samples were also assessed. The importance of these properties to consumer acceptability of rice in Nigeria is highlighted.

- NPA 683 Adeyemi, I.A., Idowu, M.A. (1990). Evaluation Of Pregelatinized Maize Flour In The Development Of Maissa. A Backed Product. **Nigerian Food Journal. Vol.8** Pp. 63-73.

Pregelatinized maize flour, prepared from steam grains, was evaluated as composite flour for its water holding capacity WHC of wheat flour, ungelatinized and pregelatinized maize flour, and cassava starch were 0.62, 0.82, 1.50 and 0.58 ml/g respectively while corresponding values for their gels were 4.1, 5.0, 2.6 and 6.4 ml/g respectively. Composite flour containing pregelatinized maize flour had higher water absorption and low amylograph setback values than that containing ungelatinized maize flour. Taste panel evaluation showed that loaves baked from a composite flour containing up to 40% maize flour were acceptable.

'Maissa', developed from formulations consisting of maize flour, cassava starch and 20% wheat flour was evaluated for acceptability. Analysis of data showed that the product baked from a recipe containing 20% pregelatinized maize flour the most acceptable with a total score of 69.50.

- NPA 684 Adindu, M.N., William, J.O., Adiele, E.C. Robert, S.I. (1998). Studies On The Used Of Phosphine (PH₃) In Controlling Aflatoxin Production In Stored Groundnut (*Arachis hypogaea*) And Wet (Maize (*Zeamais*)). **Proceeding Of 22nd Annual NIFST Conference. Vol.1.** Pp. 24-25.

The result shows that no aflatoxin formation was detected in peanut and wet maize stored hermetically in phosphine for 6 months.

- NPA 685 Adoga, G.I. (1987). Role Of Lipolytic Enzymes In The Deterioration Of Groundnut [*Arachis hypogaea*] Cakes: A Comparison With Fresh Milk. **Journal Of The Science Food And Agriculture. Vol.41. No.1.** Pp. 65-68.

The free fatty acid (FFA) content of fresh milk and groundnut (*Arachis hypogaea*) cakes, released by the activity of lipases, was used to assess their deterioration at 26°C and 4°C. Lipolysis of the fresh milk as measured by the level of FFA content was about 69% complete in 24 h and 86% complete in 48 h at 26°C. In groundnut cakes, lipolysis was 15% complete in 48 h and 80% complete after 4 days at 26°C. The rates of

lipolysis at 4°C for groundnut cakes (under dry conditions) and fresh milk were minimal. It is therefore recommended that groundnut cakes be stored at below ambient temperatures under dry or reduced humidity conditions.

- NPA 686 Adu, O.O. (1979). Evaluation Of Seven Fumigant As Possible Cowpea Seed Grain Protectants.
NSPRI Technical Report. No.5. Pp. 57-62.

Seven fumigants were evaluated for the control of insects in cowpea seed in store. The relative effectiveness of the fumigants against adults of *T. castaneum* (Herbst) was in the order (Phosphine>Acrylonitrile>Methyl Iodide>Methyl Bromide>Ethylene Dibromide >Methyl Formate>Ethyl Formate. Four of the fumigants, Ethylene Dibromide, Ethyl formate, Methyl formate and Phosphine showed no deleterious effect on cowpea germination at dosages effective against adult *T. castaneum* (Herbst) while Methyl Iodide, Methyl bromide and Acrylonitrile controlled the insects but reduced the viability of the fumigated cowpeas.

- NPA 687 Adu, O.O. (1982). Protection Of Stored Maize From *Sitophilus zeamais* (Mots) By Vegetable Oils.
NSPRI Technical Report. No.2. Pp. 33-40.

Five vegetable oils (palm oil, corn oil, coconut oil, groundnut oil and palm kernel oil) were tested as possible stored maize grain protectants against *Sitophilus zeamais* (Mots). Corn oil, coconut oil and groundnut oil gave complete mortality of insects at 10ml/kg of grains treated with palm oil and palm kernel oil. All the oils at 15ml/kg completely suppressed progeny development of test insects. Germination was not adversely affected by the oil treatment.

Insects introduced to the grains treated with oils at monthly intervals showed (through their mortality records) that the protection of the seeds cannot last more than three months.

- NPA 688 Agbo, N.G. Koname, N.C., Kohoro, H., Traore, R. and Osho, S.M. (1995). Status Of Soybean Production And Utilization In Cote D'Ivoire.
Post-Harvest Technology Of Commodity And Marketing. Proceeding Of A PostHarvest Conference. Accra Ghana. Pp. 157-162.

Soybean was officially introduced into Cote d'Ivoire in 1989 and the Government assigned the task of initiating production to the office of "Direction et Controle des Grand Travaux". This office oversees a major agricultural project to settle farmers in the northwest region of the country and introduce modern farming systems. As part of this project, soybean production reached 3061 tonnes. The bulk of the soybean harvest is processed industrially with household utilization confined to a few urban dwellers and people in the production zone. To redress this imbalance there is a need to inform more people in Cote d' Ivoire about the advantages of soybean and how it can be used for human and animal nutrition. This work aims to promote more household usage and to achieve this people need to be shown how to include soybean into their traditional foods and how to prepare a range of soybean products for home use and sale. Stimulating household use will strengthen the marketing base for farmers and improve the nutritional status of the communities.

- NPA 689 Aiyeye, F.B. and Oloyo, R.A. (1997). Effects Of Manganese And Thiamine Supplementation Yest Activity In BarteY Malt/Maize Arit Works.
Nigerian Food Journal. Vol.15. Pp. 9-14.

The effect of replacing malt (grist) with graded levels of (0.25,50,70 and 100 percent maize (grift) and supplementation with 0.0 or 0.5 mg/1 thiamine or 0.0 or 5.0mg/1 manganese for mashing and wort production was monitored by the disappearance of glucose from the fermenting liquor over 12 hours. Results obtained indicated that only 25 percent of malt grist could be replaced by maize grit when the wort had no vitamin and mineral supplements. Supplementation of the wort with either thiamine or manganese or both combined increased the replacement level to 75 percent.

- NPA 690 Aiyeye, F.B. (1999). Extraction Characterisation And Utililization Of Musk Melon Fruit And Seed Oil.
Proceeding Of 23rd Annual NIFST Conference. Pp. 243-24.

Proximate composition of muskmelon fruit gave: fibre content, 13,66%; protein, 0.09%; lipids, 5% and moisture content 5.2%. The seed oil has the following physical characteristic; visual colour, yellow; % yield 42 moisture content 9.2%; refractive index, 1.42 (at 40C); specific gravity, 0.914. The chemical characteristics measured for the oil are: iodine value, 859; Peroxide value, 0.8 Emg/kg; acid value, 0.4mg KOK/g; sponification number, 182 mg KOH/g.. These values compare favourably with those of

vegetable seed oils like palm. Soya bean, melon, and groundnut. It could be inferred that both the fruit flesh and seed oil of muskmelon are applicable in culinary purposes.

- NPA 691 Ajayi, F.A. and Lale, N.E.S. (2001). Susceptibility Of Unprotected Seeds And Seeds Of Local Bambara Groundnut Cultivars Protected With Insecticidal Essential Oil To Infestation By *Callosobruchus maculatus* (F) (Coleoptera:Bruchidae).
Journal Of Stored Product Research.Vol.37. Pp. 47-62

The three essential oils significantly reduced the percentage of *C. maculatus* adults that emerged from the bambara groundnut cultivars in the F1 generation and the number of adult offspring that developed in the cultivars during the 3-month storage period. The mean number of progeny that developed in untreated seeds and seeds treated with clove, WABP and ginger oils during the study period were 73.0, 0.0, 0.1 and 0.2, respectively. No adult *C. maculatus*, however, developed in slightly and moderately susceptible cultivars treated with essential oils. Treatment of seeds of Bidi (a susceptible cultivar) with the essential oils reduced the percentage of adults that emerged in the F1 generation from 26.8% in untreated seeds to 0.0, 0.1 and 0.4% in seeds treated with clove, WABP and ginger oils, respectively, and reduced loss in seed weight after three months' storage from 34% to 0.0, 0.01 and 0.1%, respectively.

- NPA 692 Ajibola, Taylor (1971). On The Flight Activity Of *Sitophilus zeamais* Motsch. (Coleoptera:Curculionidae) And Some Other Grain-Infesting Beetles In The Field And A Store.
Journal Of Stored Products Research.Vol.6. Pp. 295-306.

The flight periodicity curves for *Carpophilus dimidiatus* in the field and *Tribolium castaneum* in the store are described. Both species exhibited wide single distribution flight curves and the ability to fly intermittently throughout the 24 hr-day cycle

- NPA 693 Ajulo, E.A. and Opadokun, J.S. (1973). Aflatoxin Contamination Of Unrefined Groundnut Oil.
NSPRI Technical Report No.4. Pp. 39-41

The aflatoxin B content of fifty-seven samples of both mill produced and locally produced groundnut oil samples of the 1972-73 groundnut crop have been determined. Fifty-six of the samples had aflatoxin content of

20ppb. or below, while one sample had an aflatoxin content of 40ppb. At these low concentrations, it is considered that there is little health hazard in the consumption of unrefined groundnut oil produced in Nigeria.

- NPA 694 Akani, A.O., Ochanwe, C.N. and Omoniyi, I.O. (2000). Determination Of Optimum Impact For Decortication Of Bambara Groundnut. **Proceeding Of the First International Conference And Millennium General Meeting Of The Nigerian Institution Of Agricultural Engineers. Vol.22.** Pp. 87-89.

The results showed that size has significant effect on the optimum impact force required to decorticate bambara groundnut pods at 5 level of significance (t-test). The optimum impart forces required to decorticate the small, intermediate and large sizes were 0.30. 0.38 and 0.59N respectively. Under these impact forces, the percentage decortication achieved were 92.95 and 100% and the respective damages were 6, 8 and 5%.

- NPA 695 Akano, D.A. and Kuku, F.O. (1982). An Assessment Of Mouldiness Of Maize And Groundnut Samples From Oyo, Ondo And Kwara States Of Nigeria. **NSPRI Technical Report. No.7.** Pp. 77-83.

This paper reports on the moisture content and mouldiness of the samples analysed. The range in level of mouldiness (45.5-86.6%) obtained for the maize samples from the three States was high throughout the period of the survey. In most cases, there is no direct relationship between moisture content and degree of mouldiness as some samples had over 20% moisture content. Groundnuts (over 50%) while samples from Kwara State recorded lower levels (below 40%).

A total of thirteen mould species were isolated in all.. *A. flavus*, *A. niger*, *A. tamarii* & *Fusarium moniliforme* predominated in that order. The remaining species occurred less frequently.

- NPA 696 Akano, D.A., Atanda, O.O. and Ogundipe, H.O. (1992). Effect Of Storage On Some Nutritional Qualities Of Soyabeans. **Tropical Science. Vol.33.** Pp. 95-99.

The study showed that well dried soya beans are best stored whole in airtight plastic containers or polythene-lined polypropylene bags. Storage

in dehulled or powdered forms in ordinary woven polypropylene bags, or in ordinary jute bags, should be discouraged.

- NPA 697 Akano, D.A. and Afolabi, J.F. (2002). Incidence Of Aflatoxin Production And *Aspergillus flavus* Invasion In 14 Varieties Of Groundnuts. **Postharvest Science. Vol.1. No.** Pp. 26-30.

The “Non Parametric Test” shows no direct relationship between moisture content and level of mouldiness in all the samples. The moisture content for most samples were below the safe level of 6.5% for shelled groundnut, an indication that the samples were very dry. However, the high level of mouldiness shows that drying alone with solar heat energy cannot eliminate mould spores from produce.

There is still need for continuous monitoring of groundnut and consumable food items for aflatoxin contamination.

- NPA 698 Akapo, S.O., Oguntade, A.T. and Olorundare, O.F. (1995). Nutritional Evaluation Of Weaning Food Formulation Prepared From Soyabean, Sorghum And Crayfish. **Nigerian Food Journal. Vol.13.** Pp.1-12.

Results showed that the nutrient content of supplement B comprising soybean-sorghum-crayfish in proportion 20:60:20 (on dry weight basis) compared favourably with those of the commercial weaning foods used as control in the study. It also complied with infant food specifications established by FAO/WHO/PAG and acceptable to the taste panel in appearance, light brownish colour, good glavour and taste. Hence, supplement B is recommended as the basis for the preparation of weaning food from soybean, sorghum and crayfish

- NPA 699 Akingbala, J.O. And Rooney, I.W. (1990). Effect Of Flour Particle Texture And Size On The Consistency Of Sorghum Tuwo. **Nigerian Food Journal. Vol.8.** Pp. 48-55

Softness and stickiness of sorghum tuwo were correlated significantly with particle size index of the flour determined by the texture of the kernel. Flour fractions of the smaller particle sizes produce softer tuwo in acid alkali or neutral medium than factions of larger particles. However hardness or corneousness of the particle and not size per-se appears responsible for tuwo softness and stickiness. Softness and stickiness of tuwo may be related to the extent of starch damage during cooking and to swelling and water binding capacities in the cooked flour particles

- NPA 700 Akinnusi, O.A., Shejbal, J. Sowumi, O., Oteniran And Nwangwa, J.O. (1981). The Effect Of Shading And Insulation On Maize Stored Under Nitrogen In Metal.
NSPRI Technical Report. No.1. Pp. 27-40
- Temperature, oxygen concentration, moisture, germ inability, chemical constituents, nutritive value (using white albino rats) and organoleptic properties were measured from time to time throughout the one year storage period. There was also no trend or significant variations in the organoleptic acceptability of meals prepared from the maize.
- NPA 701 Akintayo, E.T., Oshodi, A.A. and Esuoso, K.O. (1998). Effect Of Chemical Modifications On The Physio Chemical Properties Of African Yambean (*Sphenostylis Sterno-carpa*) Starch.
Proceeding Of 22nd Annual NIFST Conference. Vol.1. Pp. 28-30.
- The viscoamylographic studies of the unmodified and modified starches show them to exhibit a mixed viscosity pattern, type B at lower concentrations and type A at higher concentrations.
- NPA 702 Akinjayeju, and Soniregun, O.O. (1998). Effect Of Sprouting On The Nutrient Composition And Physical And Rheological Properties Of Cowpea Flours
Proceeding Of 22nd Annual NIFST Conference. Vol.1. Pp. 22-23.
- Both sprouted samples recorded lower values for all the physical parameters measured when compared to their unsprouted counterpart. While water absorption capacity and % swelling values were higher for samples sprouted for 4 days solubility and bulk densities decreased as sprouting time was increased. Those values are consistent with previously reported values for beans sprouted for 3 days⁴. Gelatinisation temperatures of sprouted samples were much higher than that for unsprouted flour which however had higher maximum and cooled-paste viscosity values.
- NPA 703 Akoma, O., Onnoha, S.A., Iyaaba, O.A., Alabi, O.J. and Nwaonumah, E. (1999). The Effects Of Fermentation On The Nutritional And Sensory Characteristics Of Apapa/A Nigerian Maize Meal).
Proceeding Of 23rd Annual NIFST Conference. Pp. 40-42.

Significantly, the 'apapapa' produced from the 72h FMS and the control did not differ ($p>0.05$) in appearance, texture and taste. The results of the present study indicated that the overall nutritional value of 'apapapa' had been improved substantially by fermentation using *C. tropicalis*.

- NPA 704 Akpapunam, M.A. (1985). Characteristics Of Moin-Moin Flour Prepared From Cowpea/Maize Blends.
Nigerian Food Journal NIFST.Vol. 1,2 and 3 Pp. 207-208.

The moisture content of moin-moin decreased with increasing amount of maize in the blend. It ranged from 38.65% in moin-moin made from cowpea/maize (25.75) blend to 43.19% in the all cowpea moin-moin. All treatments produced moin-moin which were highly acceptable in organoleptic quality. Taste panel results indicated no significant difference ($P<0.05$) in colour. These two treatments differed significantly ($P<0.05$) on the above characteristics from moin-moin made from cowpea/maize(50:50 and cowpea/maize (25.75) blends respectively. Whipping the blends to incorporate air and using very fine maize flours were essential in producing good texture products.

- NPA 705 Akubor, P.I. (1998). Functional Properties Of Cowpea-Plantain Flour Blends.
Proceeding Of 22nd Annual Annual NIFST Conference.Vol.1. Pp. 63-65.

Water and oil absorption capacities of flour blends increased as the level of plantain flour increased in the blend. The results in Table 1 show that the blends would be useful in bakery products where hydration to improve handling is required, and in ground meat, doughnuts, pancake, etc., where oil absorption property is of prime importance.

- NPA 706 Akubor, P.I. (1999). Preliminary Studies On The Preparation Of Soybean And Sweet Potato Infant Mixes.

Proceeding Of 23rd Annual NIFST Conference. Vol.1. Pp. 227-228

Since soybean is low in sulphur containing amino acids but high in lysine¹ and sweet potato is high in sulphur amino acids but low in lysine, the proteins of soybean would complement the sweet potato protein and improve the nutritional quality of the blends³. The soybean and sweet potato blends had a mean caloric value of 422.2 Kcal/100g sample. The caloric value increased with increase in soybean flour in the blends. The

70:30 (Soybean: Sweet potato) blend was rated higher for all the sensory attributes evaluated in relation to other blends. There were no differences ($P>0.05$) in taste, colour, texture, and flavour between the 70:30 blend and the Nutrend. In conclusion, soybean and sweet potato flour blends could be used in supplementary feeding.

- NPA 707 Akubor, P.I., Achi, O.K. and Offonf, S.U. (1999). Influence Of Storage On Chemical, Microbial And Consumer Acceptability Of Milk-Like Product From Melon Seeds.
Proceeding Of 23rd Annual NIFST Conference. Pp. 241-242.

At 10°C, the overall acceptability score of the milk did not fall below 4 (good) within 3 days of storage, but decreased thereafter. At 30°C, the milk was rated 4 (good) at the 24 hours storage and subsequently rated 2 (poor). On the 2nd day of storage, milk showed gas and acid production, distinct off-flavour and colour had deteriorated markedly. If a score of 4 is taken as the minimum acceptability desirable, then the melon milk could be stored well at 30°C for 1 day and 3 days at 10°C.

- NPA 708 Aliyu, H.M. and Stephen, M. (1999). Production And Evaluation Of The Physical And Chemical Properties Of Danya (*Scierocarya Birra*) NutOil.
Proceeding Of 23rd Annual NIFST Conference. Pp. 259-260.

The high percentage of oil obtained was probably due to the efficiency of the method employed. The sun drying of the seeds before grinding has also contributed to the high percentage yield of the oil. This is because the little heat provided by the sun has made the oil in the seeds readily available. The oil was liquid at room temperature and golden yellow in colour. The infrared spectroscopy of the oil showed the existence of different functional groups of the oil. From this study it will be concluded that the oil will be good for consumption because of its low acid value content.

- NPA 709 Anih, C.A., Iheadigwu, A. (1999). Optimization Of The Method Used In Production Of Spiced 'Kunun Zaki' And The Effect Of The Spices On The Product.
Proceeding Of 23rd Annual NIFST Conference. Pp. 37-39.

As shown in Table 1, with the exception of sample A, four others exhibited increased shelf-life from 1-8 days and improved flavour. Sample B was ranked the best, followed accordingly by D, E and C while A was fair in terms of taste, flavour and general acceptability. In sensitivity test, samples B exhibited strong inhibition, D showed slight inhibition while C showed little growth, followed by E with fairly large growth. Similarly A had very profuse growth. Conclusively scientific method and spices improved the quality of “Kunun-Zaki”.

- NPA 710 Anih, M.C. and Aniedode (1999). Production Of Biscuits Using Nigerian Varieties Of Sorghum (*Sorghum Vulgare*) And Groundnut (*Arachis Hypogea*) Flour.
Proceeding Of 23rd Annual NIFST Conference. Pp. 76-78.

This study has shown that baking at 180°C for 45 min., resulted to quality biscuit with composite flours, Sorghum/groundnut, comparable with the biscuit produced from wheat. Thus the production of biscuits with composite flours, sorghum/groundnut is recommended.

- NPA 711 Anuonye, J.C., Iwo, G.I. and Misari, S.M. (1999). Preliminary Studies On The Characterization Of 17 Varieties Of Beni-Seed Based On Processing Qualities.
Proceeding Of 23rd Annual NIFST Conference. Pp. 256-258.

There was no noticeable bitterness in any of the extracted oil samples as is the case with beniseed oil extracted from non dehulled seeds. This showed that processing eliminated the bitter factor associated with beniseed.

- NPA 712 Apeji, Ojo John (1982). The Micro Organism Associated With Some Deteriorated Nigeria Cereal Grains.
Being The Title Of A Research Project Carried Out In Partial Fulfilment Of The Requirements For The Award Of A Bachelor Of Science (B.Sc) Hons In The Department Of Botany University Of Jos, Nigeria.

The implications of these results on the grains food content together with the effects of the microbial metabolites on the decayed grains consumers are reported and discussed

NPA 713 Ashama, K.S. and Olumeko, D.O. (2000). An Assessment Of The Effectiveness Of Two Storage Structures For Household Storage Of Cowpea.

Proceeding Of The First International Conference And Millennium General Meeting Of The Nigerian Institution Of Agricultural Enginners.Vol.22. Pp. 90-92.

This study assesses the effectiveness of plastic containers and hessian sacks for the storage of cowpea at household level with and without the use of phostoxin.

Percentage grain damage and weight loss on dry matter basis after a twenty-five week storage period were lower in cowpea seeds stored in plastic containers than those stored in hessian sacks. When treated with phostoxin a difference of 0.20% was obtained. When no treatment was applied the difference was 7.4%. Cowpea seeds stored in plastic containers commanded higher market value than seeds stored in hessian sacks when no pest control measure was applied.

NPA 714 Asoegwu ,S . N . and Eke, C . N .U . [2009] The Relationships Between Some Physical Properties and Seed Weight Of Jackbean Seeds .

Proceedings Of 3rd International Conference Of WASAE and 9th International Conference Of NIAE pp256—259.

The seed industry utilizes gravity separators to upgrade quality of seed lots by removing diseased, damaged or other undesirable seeds that are somewhat lighter than the remaining good quality seeds . The Liner relationships between seed weight and some physical properties of jack bean seeds were determined. The physical properties were measured and or calculated using standard measuring instruments and equations. The data generated were used to perform statistical calculations generated were used to perform statistical calculations using liner and quadratic regressions as deemed appropriate.

NPA 715 Asumugha, Victoria. U. (1998). Soybean (Glycerine Max) Processing And Utilization among Rural Households.

Proceedings Of The 32nd Annual Conference Of The Agricultural Society Of Nigeria. Pp.245-249

The processing and consumption pattern of soybean was investigated in Ikwuano rural communities of Abia state. Three hundred households were used for the study . Questionnaire, laboratory and chemical analysis were used for collecting data . Results showed that majority [90. 33%] of the

respondents have knowledge of soybean as well as utilize it in various patterns . A few of the respondents [1 . 67%] do not have such knowledge of soybean. Forms of soybean consumed by respondents include use as soup thickener [35. 96% } weaning food [15%] . Akara [9%] and moimoi [12%] .Four major processing methods adopted by the respondents are as follows: Pick damaged seeds/sort, blanch 15 minutes, wash, Dehull, dry, roast and mill. Pick damaged seeds/sort, cook 45 minutes, wash, dehull, dry, roast and mill. Pick damaged seeds/sort, soak overnight, dry, roast and mill.

Pick damaged seeds/sort, roast and mill.

There is need for further education on diversified methods of soybean use in the traditional food consumption pattern of the people.

- NPA 716 Awonorin, S.O. and Bamiro, F.O. (1993). Sun-And Hot Air Drying Of Soybean: A Comparative Study Of Selected Quality Parameters And Storage Of The Oil Obtained By Solvent Extraction.
Nigerian Food Journal. Vol.11. Pp. 84-97.

The hot air drying experiments were carried out using air velocity of 1.7m/s at temperatures of 40, 60 and 80°C. The peroxide value, free fatty acids, iodine value and viscosity of the fresh oil samples ranged from 0.3 – 2.0 m-Eq/kg, 0.13-0.28% as oleic acid, 113 – 118, and 0.066 – 0.085 kg/m.s, for viscosity respectively, in the sun dried experiments. The corresponding data for the hot air-drying conditions were 2.3 – 3.8 m-Eq/kg, 0.09 – 0.24% oleic acid, 98 – 108, and 0.051 – 0.062 kg/m.s respectively. These values increased during storage, and the mean sensory scores for colour and odour diminished with increasing period of storage, but were still acceptable at the end of 12 weeks.

- NPA 717 Ayeni, F.O. and Nwangwa, S.C. (1973). A Survey Of Insect Infestation On Imported Grains.
NSPRI Technical Report. No.9. Pp. 71-72.

In order to determine if foreign pests were being imported into Nigeria, a survey of insect infestation on imported grains was conducted between 1972 and 1974, on ships, on arrival, in tansit and in local stores.

Infestation was generally light and with the exception of *Oryzaephilus surinamensis* L. all the major pest species encountered are common on Nigerian Produce.

NPA 718 Ayo, J.A. and Okaka, J.C. (1998). Interaction Effects Of *Cadaba Farinosa* Crude Extract And Pit Levels On Some Physiochemical Properties Of Kunun Zaki.

Proceeding Of 22rd Annual NIFST Conference. Pp. 31-32. Vol.1.

The increase in the reducing sugar content as a result of the interaction effect (*C.farinosa* x pH) particularly at pH 5.5 has proven the potential of *C.farinosa* as sweetening aid for *kunun zaki* and related beverages .Also the decrease in the viscosity as a result of the same effect had advantageously affected the mouthfeel, consistency and other rheological properties of *kunun zaki*.

NPA 719 Ayo, J.A. (1998). Effect Of *Cadaba Farinosa* Crude Extract On The Sensory And Microbial Qualities Of "Kunun Zaki".

Proceeding Of 22nd Annual NIFST Conference. Vol.1. Pp. 19-21.

The *C.farinosa* crude extract, apart from the colour, had a significant effect on the sensory qualities and microbial count of "kunun zaki". The increase in the sweetness mean score with increase in *C.farinosa* crude extract showed the high potential of the exxtract as sweetener aid for "kunun zaki" and other related beverages. The crude exaract had more demonstratable antimicrobial affect on the total viable count than on the mould and yeast count of the "kunun zaki". This antimicrobial effect, if properly made use of can be advantageous in the preservation of "kunun zaki" product.s.

NPA 720 Akinyemi, J.O. and Okenla O.O. (2001). A Comparative Study Of Maize Storage Structures In Tropical Rain Forest Zone Nigeria.

AMA.Agricultural Mechanization In Asia, Africa And Latin America. Vol.31. No.1. Pp. 35-40.

The on-farm maize storage structure used by some farmers in South-western Nigeria were studied. Results show that of the cribs, barns and silos being used by these farmers, 70% of them make use of cribs. Even though silo was reported to store maize better than the crib and barn, farmers are still not eager to accept the method because they believe it is not cost effective to construct one.

The costs of construction of these structures depend highly on the availability of the materials used. With about 85% of the farmers interviewed (being mainly rural farmers), there is a need to develop a

more efficient post-harvest technology that can easily be adopted by the farmers in the study area.

- NPA 721 Birewar, B.R. (1996). Development Of Improved On- Farm Grain Drying Facility In Nigeria.
AMA Agricultural Mechanization In Asia, Africa And Latin America. Vol.27. No.1. Pp. 51-53.

The traditional method of drying grain under sun heat is not possible under adverse weather condition, particularly in high rainfall area. Similarly, the smoke drying method for drying of maize cobs was found quite uneconomical, ineffective and inefficient. Therefore, a simple design of natural draught fuel operated on-farm crop dryer of 0.15 m³ or 110kg. Capacity for maize using agricultural waste material was developed at the Crop Storage Unit of the Federal Department of Agriculture, Ibadan, Nigeria and tested for drying of maize. As per performance test results, it was found satisfactory. The average rate of extraction of moisture was 0.9%/h. It is now being popularised in the country for drying of different food grains.

- NPA 722 Bako, S.P. and Nandang, E.B. (2002). Effect Of Kinetin And Gibberellic Acid On Germination And Seedling Growth In Stored Cowpea And 14 Maize Seeds.
Post-Harvest Science. Vol.1. Pp. 70-71.

There were no significant variation between duration of exposure within each storage temperature for both growth regulators in the two crops. The physiological principles involved in these responses are discussed.

- NPA 723 Banigo, E.O.I, Ihimoyan, K.J. and Osai, G.E.A. (1986). Development Of Soy Beverage For Nigeria.
Nigerian Food Journal NIFST Vol.4 No1 . Pp. 53-64.

Microbiological examination showed that the soybeverage was safe for human consumption while urease activity test indicated adequate heat treatment for the inactivation of trypsin inhibitors.
A yield of 9 litres of soybeverages per kilogram of raw soybeans was obtained in this study

- NPA 724 Banigo, E.O.I., Olusanya, J.O. and Osai, G.E.A. (1987). An Evaluation Of The Performance Of Grantex Rice Mill. **Nigerian Food Journal.Vol.5.** Pp. 12-17.

Soaking paddy rice in hot water at 70°C for 6hr, followed by steaming in an autoclave at 15 p.s.i.g. (121.2°C) for 10 minutes and drying at ambient temperature for 48 hours gave the best results as follows: 68.0% total yield, 94.8% dehulled and 98.3 head rice. Subsequent milling to the final polished state reduced the percentage total yield while the percentage dehulled and percentage head rice increased.

- NPA 725 Banigo, E.B., and Akpapunam, M.A. (1987). Physio-chemical And Nutrition Evaluation Of Protein Enriched Fermented Maize Flour. **Nigerian Food Journal** Vol. 5 Pp. 30-36.

The resulting blends were creamy amber yellow in colour, free flowing, non-hygroscopic and dispersed readily in hot water. Feeding experiments with growing rats showed that pumpkin flour protein and fish meal protein improved the protein quality of fermented maize flour. Protein efficiency ratio (PER) for the blends were as follows: Mp_0F_0 , 0.91: MP_1F_0 , 1.97: MP_2F_1 , 2.84: MP_3F_2 , 23.11: and MP_4F_3 , 3.23 compared to casein, 2.50. Protein digestibility was fair (62-67%) in all diets.\

- NPA 726 Barber, L.I., Mepha, H.D. Zite, B.L. and Jaja, E.T. (1999). Evaluation Of The Quality Of Vegetable Oils Consumed In Port-Harcourt. **Proceedings Of 23rd Annual NIFST Conference.** Pp. 234 -235.

The result shows that this refined vegetable oils had 38-42 °C, low meeting points and remained liquid at all times, Whereas the unrefined oils with high melting points, 45-62 °C ,[Cocount, palm kernel and palm oil] were either solid or liquid depending on the period of the year. Unrefined palm oil had the lowest smoken point, 48 °c . While palm kernel oil had the highest smoke and flash points [120 °c and 200 °C respectively], Although these qualities make palm kernel oil suitable for frying, the high saponification values suggests its potential in soap and detergent manufacture.

NPA 727 Barimaka, I.S, Ahinewhu, S.C., Osondu, F.C. and Mepba, H.D. (1999). Yield And Some Physico-Chemical Properties Of Bambara Groundnut (*Vigna Subterranea*) Starch.

Proceedings Of 23rd Annual NIFST Conference. Pp.183-185.

The gelatinization temperature ranges for bambara groundnut – starches 75-82°C,[average] were higher than 67-73 and 71-75°C , cassava and corn starches respectively . The reason could be attribute to the granule characteristics , which has been inferred to be smaller than those of corn and cassava starches .

NPA 728 Bode Meretiwon, (1981). Factors Associated With Maize Storage Techniques At Farmers Level In Oyo State Of Nigeria.

NSPRI Technical Report. No.8. Pp.79-86.

No significant difference was found between age of farmers and their storage practices. There was however a significant difference ($P < 0.01$) between maize acreage and methods of storage.

Product-moment correlation analysis showed that adoption of Improvements of storage techniques poorly correlated with age of farmers ($r = - 0.05$) but fairly correlated with farmer's education ($r=0.39$) and his social participation ($r = 0.48$).

NPA 729 Bolaji, P.T., Abbo, E.S. and Uwazulike,V.E. (1999). The Effect Of Particle Size On The Moisture Sorption Isotherm Of Acha Cookies.

Proceedings Of 23rd Annual NIFST Conference. Pp. 47-49.

The MSI shows the relationship between the EMC and a_w ,, at a constant temperature . The MSI plot for most foods show a typical sigmoid shape ³ . The shapes³ of the plots are somewhat sigmoidal and similar to those obtained for cookies⁴ . The lowest monolayer moisture content of 0.14gH₂O/g solid was obtained in cookies produced from flour of 710µm particle size [Table 1] and this is expected to give the best shelf life of the four cookies .

NPA 730 Booker, R.H. (1967). Observations On Three Bruchids Associated With Cowpea In Northern Nigeria.

Journal Of Stored Products Research. Vol.3. Pp. 1-16.

There are differences in the susceptibility to attack of different cowpea varieties, the larger seeded varieties of those tested being in general, better as hosts. This was shown not to be due to larval competition within

the seeds. There was a definite preference for oviposition on seeds with a smooth testa when there is a choice of smooth and rough, but there seemed to be no colour preference.

One insect can cause a 3-5 per cent weight loss in a cowpea seed. The decrease in weight loss per individual insect is lower when there are several larvae per seed. Germination is adversely affected when there are three or more insects per seed

- NPA 731 Bolwfawi, S.J. (2001). Performance Evaluation Of Pedal Operated Cowpea Thresher.
Proceedings Of The International Conference 8 Annual General Meeting Of The Nigerian Institution Of Agricultural Engineers. Vol.23. Pp. 65-70.

A Bicycle chain-drive Cowpea Thresher was evaluated for its performance. Some of the physical properties of the four varieties of cowpea (1.25, IAR48, ITA60 and SOVITA) were determined. The threshing efficiency and mechanical damage were important parameters investigated at moisture levels of 12.5% and 9.5% dry basis. Analysis of the results show a high threshing efficiency and high mechanical damage for reduced moisture levels from 12.5% to 9.5% for all the varieties investigated. An optimum feed rate 20kg/hr was found to be suitable for higher efficiencies

- NPA 732 Broadbent, J.A. (1966). The Micro-Floral Germination And Seedling Vigour Of Some Seed Maize.
NSPRI Technical Report. No.15. Pp.113-114.

Some shelled yellow maize was examined at Ifonyintede silo in mid September. The maize was stored in about twelve sack and was to be distributed to farmers as seeds for the second maize crop. It was found to visibly mouldy, a yellow green mould being predominant. Two samples were taken for microbiological, germination, and seedling vigour studies.

- NPA 733 Broadbent, J.A. (1966). Microbiological Deterioration Of Maize Used As Poultry And Livestock Feed At Farms Near Ibadan During The Wet Season.
NSPRI Technical Report. No.11. Pp.115-118.

Most of the feed maize examined was visibly mouldy. Sometimes this deterioration occurred before the maize was delivered to a farm, as was the case at Moor Plantation. These findings might be expected in view of the moisture contents of the maize examined, which ranged from 16.2% to 24.4% and so were all above the maximum for safe storage (about 12.5%). The most serious aspect of the microbiological deterioration of feed maize is the possible production by the associated micro-organisms of substances toxic to farm animals. Therefore, it is of some concern that *Aspergillus flavus* was the commonest mould isolated from two samples of mouldy feed maize (see Table 2). The ability of this mould to produce aflatoxin, a substance toxic to many farm animals, is well known. Aflatoxin assays of six samples of mouldy feed maize showed that two of the samples contained detectable amounts of aflatoxin, one in the medium toxicity range² and the other in the high toxicity range. Several of the other more abundant moulds isolated from the two maize samples are also known to produce substances toxic to farm animals (i.e., *A. fumigatus*^{3,4,7}, *A. niger* sp^{6, 7}, *Fusarium moniliforme*³, *Paecilomyces varioti*^{3, 5} and *Penicillium variable*²).

NPA 734 Broadbent, J.A. (1967). Internal Mouldiness Of Market Groundnuts).
NSPRI Technical Report. No.11. Pp.105-107.

The mould isolated from the internally mouldy kernels are listed in table 2 with details occurrence in each of the samples.

NPA 735 Broadbent, J.A. and Oyeniran, J.O. (1968). A Preliminary Experiment On The Airtight Storage Of Damp Maize.
NSPRI Technical Report. No.9. Pp. 71-75.

The result of the moisture contents insects damages and microflora studies are given in Tables 1-3

NPA 736 Broadbent, J.A., Kuku, F.O. and Oyeniran, J.O. (1968). The Internal Microflora Of Market Groundnuts In Ibadan.
NSPRI Technical Report. No.3. Pp. 27-37.

Table one contains information on groundnuts samples and details of occurrence of internally mouldy kernels in each samples.

- NPA 737 Buahin, G.K. and Turaki, J.M. (1999). Studies On Oviposition Behaviours Of Cowpea Bruchid ,*Callosobruchus maculatus* (F) On Seeds Of Cowpea *Vigna Unguiculata* (L) Walp
.Bioscience Research Communications.Vol.11. No.3. Pp. 235-240.

The effects of egg densities per cowpea seed on the oviposition behaviour of *C. maculatus* were studied in the laboratory. The results generally showed that the number of eggs oviposited when females decided between five categories egg loads 1.egg to 5.eggs in smooth – and rough-seeded cowpea was significantly ($P < 0.05$) lower in higher egg density seeds. The results of the effect of time lag on the egg-load indicated that the average increase in the number of eggs laid by *C. maculatus* on the smooth and rough varieties lasted 12h and 24h respectively before the egg distribution became uniform

- NPA 738 Clarke, P.A., Parry, J.K. and Rice, J.E. (1982). Off-Odour In Nigeria Rice-Part2: Field And Extension Studies.
Tropical Science. Vol.24. No.3 Pp. 165-172.

Following laboratory investigation, observations were made in northern Nigeria of post-harvest practices in rice processing in an effort to remedy off-odour in parboiled rice Following laboratory investigation, observations were made in northern Nigeria of post-harvest practices in rice processing in an effort to remedy off-odour in parboiled rice.

A processing technique was devised, appropriate to village conditions, and was demonstrated successfully to improve the quality of rice.

- NPA 739 Cornes, M.A, and Oyeniran, J.O. (1967). Fumigation Of Maize In An Aluminium Silo Using Al: ! Carbon Tetrachloride Ethylene Dichloride Mixture
NSPRI Technical Report. No.12. Pp.109-111.

Carbon tetrachloride/ethylene dichloride 1 ; 1 mixture has been used as a routine for fumigating silos in western Nigeria. [it should be pointed out here that 1; 3 mixture was mentiond in error for 1 ; 1 mixture in the general recommendations quited by Cornes and Adeyemi, [1965]. The majority of silos In use are not air-tight having a $1/2$ “ - 2’ gap at the caves, An investigation Into the efficiency of the recommended method of fumigation and post fumigation build up of infestation has been conducted under the

prevailing conditions, without any special effort to seal the silos.

- NPA 740 Cornes, M.A., Adeyemi, S.A. and Qureshi, A.H. (1967). An Assessment Of The Value Of Phosphine And Thylene Dibromide For The Control Of Pests In Grain Stored In Polythene Lined Sacks.
NSPRI Technical Report. No.13. Pp. 113-117

The results of trial [Table 1] show that a satisfactory reduction in adult insect population was achieved in all phosphate treated bags although complete eradication of *S. seamais* was not achieved by any of the treatments. The incubated samples confirm that a similar kill of early stages of these pests was achieved by phosphate. *S. seamais* appeared in these samples about 32 days after the date of application of the fumigant which suggests that the egg is a resistant stage for this insect although sporadic emergence over a further two weeks indicates that the phosphate may have retarded development.

- NPA 741 Cornes, M.A. and Nwangwa, S.C. (1972). An Assessment Of Current Techniques Used For The Fumigation Of Groundnut At Apapa Wharf.
NSPRI Technical Report. No.5. Pp. 43-48.

The distribution of phosphine in four stacks of groundnuts during routine fumigation under gas proof sheets was studied by means of calibrated tubes. Assessments of pre-fumigation and post fumigation insect infestation were made by sieving.

The distribution of phosphine was found to be satisfactory and adequate can produce were achieved in 7 hours. Insect survival in two of the stacks is attributed to the weight of chains used being inadequate to give a good seal and the correct use of sand bags in preference to chains is recommended. A time lag between the development of maximum concentrations at the top, centre and after points of the 20 feet high stack was appreciable and an extension beyond the normal 72 hours fumigation period is recommended for stacks of 20 feet or more in height.

- NPA 742 Dauda, A. and Aviara, A.N. (2001). Effect Of Threshing Methods On Maize Grain Damage And Viability.
AMA. Agricultural Mechanization In Asia, Africa And Latin America. Vol.32. No.4. Pp. 43-46.

A study was undertaken to investigate the effect of five maize threshing methods, namely bare hand threshing, hand-held manually operated tool

shelter, stick beating, pounding in mortar and tractor, operated machine threshing on the threshing output, grain damage and seedling emergence of planted maize grain. Tests were carried out with these methods using three varieties of maize namely; Hybrid 8341-6, TZESR-Y and TZESR-W. Results obtained show that machine threshing gave significantly higher threshing output on all the varieties used than other methods. Its average output was 626.67 kg/hr. Among the five threshing methods bare hand threshing gave the lowest percent grain damage (0.5% on hybrid, 0.3% on TZESR-Y and 0.2% on TZESR-W), while the stick beating method gave the highest percentage (4.0%) on TZESR-Y and 1.0% on TZESR-W. Grain viability, determined on the basis of percent seedling emergence of planted maize, was found to be high for products of the threshing methods except that of stick beating. Threshing method and variety of maize feet on output, damage and viability of grains obtained from the threshing operation.

NPA 743 Dauda, A. (2001). Design, Construction And Performance Evaluation Of A Manually Operated Thresher From Small Scale Farmers In Northern Nigeria

AMA. Agricultural Mechanization In Asia, Africa And Latin America. Vol.32. No.4. Pp.47-49.

A manually land-operated cowpea threshing machine was conceived, designed, constructed and tested. The thresher was tested for three commonly grown cowpea varieties taken into consideration the range of seed sizes (large medium and small) The varieties are Kananado, Borno Brown and Aloka local,

Results obtained gave a threshing effectiveness of 85.9%, 84.6% and 84.1% for Kaqnamado, Borno Brown and Aloka local, respectively. Seed damage was 1.8%, 2.3% and 1.9% for Kananado, Borno Brown and Aloka local, respectively.

Winnowing efficiency at 372 rpm fan speed was 92.75%, 92.5% and 92.35% for Kananado, Borno Brown and Aloka local, respectively. Throughout capacity was 95.4 kg/h, 93.5 kg/h and 92.8 kg/h for Kanannado, Borno Brown and Aloka local, respectively, and is not statistically different at 5% significance level.

NPA 744 Damilola, E. Eniayeju (2001). An Overview Of The Nigeria Cereal Economy.

Journal Of Engineering And Technology For Food Agriculture And Environment. Pp. 6-14.

An overview of Nigerian Cereal. Economy, production trend, prospects and potentials for Nigeria are presented. The seed supply system, harvesting and storage as well as the factors limiting grain production in Nigeria were discussed. Analysis of the Cereal sub sector indicates that Nigeria has generally met her self food sufficiency level for grains such as Maize (Sorghum) and Millet.

It is observed that factors or issues pertaining to land tenure, political interference, institutional weaknesses, inadequate technical advice/input delivery and provision of rural infrastructures are necessary for improved Cereal production in Nigeria.

- NPA 745 Danbaba, N. and Nkama, I. [2001] Evaluation Of Wheat Varieties For Processing And Their Utilization Qualities. **Proceedings Of The 25th Annual Conference. NIFST** Pp 28-29.

The results indicate that the wheat flour sample compares favourably with the protein content of bread based wheat. The reported protein values ranged from 13.7 to 16.3% for American HPSA

- NPA 746 Deboye, O. Kolawole and Okonkwo, B.A. (1985). Microbiology Of The Traditional Fermentation Of Oil Bean (*Pentaclethra Macrophylla*-Benth) Seeds For "Ukpaka" A Nigeria Condiment. **Nigerian Food Journal**. Vol.2&3. No1 ,2,3 . Pp. 149-152.

The bacterial flora of fermenting *Pentaclethra macrophylla* seeds during the preparation of Ukpaka, a Nigerian condiment, was investigated. Four of the bacterial isolates –*Alcaligenes viscolactis*, *Pseudomonas aeruginosa*, *Micrococcus varians* and *Bacillus cereus* - disappeared within the first few days while *Enterobacter cloacae* and a *Corynebacterium sp.*, which first appeared on the second day, remained prominent throughout the seven day fermentation period. *P. aeruginosa* and *B. cereus* have not normally been associated with any useful fermentation processes elsewhere and are thought to be either seed-born or contaminants. *A. viscolactis* and *M. varians* may have initiated the fermentation but with the environment changing from acidic [pH=6.0] to alkaline [pH=8.0], *E. cloacae* and the *Corynebacterium ssp.* took over and were probably responsible for the main fermentation reaction. The implications and future prospects of these observations are discussed.

- NPA 747 Deena Vardhant, Mary, A. Raja, S. and Renuka, P. (1998). Influence Of

Azadirachtin On The Ecdysome Controlled Developmental Processes In The Stored Grain Pest: *Tribolium confusum* (Duval).
Nigerian Journal Of Entomology. Vol.15. Pp. 90-99.

Azadirachtin, a potent antifeedant and growth regulator isolated from the neem tree *Azadirachta indica* A. juss was tested against the stored grain pest. *Tribolium confusum* (duval). Optimum growth regulating effect was observed at 1000 ppm of azadirachtin. The larval development to adults was greatly reduced. Pupal mortality and abnormally developed adults were also observed. The strong influence of azadirachtin on larval – pupa and pupal – adult moults is interpreted as an interference with moulting hormone pools, thus signifying azadirachtin's role as a potential tool in controlling the stored grain pest *T. confusum* (Duval

NPA 748 Denloye, A. O. and Ade-John (1985). Moisture Sorption Isotherms Of Some Nigerian Food Grains.
Journal Of Stored Products Research. Vol.21. No.2. Pp. 53-58.

A fluidized bed apparatus that can be used to determine moisture sorption isotherms of ganular food products is descibed. The apparatus was used to obtain moisture sorption isotherms for maize cowpea, groundnuts and soyabeans at temperatures of 30, 40 and 50°C. Hysteresis was observed in the isotherms for the four products and the equilibrium moisture content was lower for the only grains (soyabeans and groundnuts) at the same value of relative humidity. The Hailwood and Horrobin equation was used to correlate the experimental data and the values of the correlating constants are tabulated. The Brunauer, Emmett and Teller equation was also to-obtain estimates of the monoslayer water content for the four grains.

NPA 749 Donald, D. and Harkness. C. (1963). Growth Of *Aspergillus flavus* And Production Of Aflatoxin In Groundnuts-Part 11.
Tropical Science. Vol.5. Pp. 143-154.

With the discovery of aflatoxin in groundnuts from many producing countries preliminary investigations were made on the 1961 crop in Nigeria. Results of the toxin tests showed that none of the varieties led was more resistant to toxin formation than another and that toxin samples appeared with equal frequency in both Northern and Riverain Provinces. Within each provincial group individual sites varied considerably for toxicity of samples and this may have been due in part to different post-harvest drying and storage procedures. The fungal contamination tests showed no evidence of varieties resistance but did indicate considerably

more contamination in samples from the Riverain Provinces than in samples from the Northern Provinces. Condition of the shell was found in effect markedly the degree of contamination of the kernels and, as for toxicity, there were considerable differences between individual sites for contamination with *Aspergillus flavus* and other fungi

NPA 750 Don-Pedro, Kio. N. (1989). Mechanisms Of Action Of Some Vegetable Oils Against *Sitophilus Zeamais* Motsch(Coleoptera:Curculionidae) On Wheat.

Journal Of Stored Products Research. Vol.25 No.4. Pp. 217-223.

The insecticidal activity of some fixed vegetable oils against *Sitophilus zeamais* on wheat was investigated. Test oils from different sources and levels of purity effectively reduced the development of progeny by similar amounts. When all wheat grains were treated with oil, X-ray studies showed that oviposition by *S. zeamais* was not affected, although there was considerable subsequent mortality. However, in a two-day choice experiment *S. zeamais* showed an oviposition preference for grains not treated with oils. Freshly applied oils caused some mortality in adult *S. zeamais* only at rates above 10.5ml/kg, but this effect disappeared when treated grains were aged for 14 days before bioassay. Application of oils at up to 17.5ml/kg to grains pre-infested with late stage larvac/pupac confirmed that these oils had no appreciable effect against such stages. X-ray studies established that the main toxic action of the oils wa against the eggs and early stage larva.

NPA751 Dudu, P.O. and Akinnusi, O. (1987). The Resistance Of Some Cowpea Varieties To Damage By The Cowpea Bruchid; *Callosobruchus maculatus* (F) During Storage.

NSPRI Technical Report. No. 2. Pp. 23-29.

Relative varietal resistance of seven improved varieties of cowpea *Vigna unguiculata* (L) Walp: 84E-1108, 820-699, 82D-716, TVX-32-36, 82E-18, VITA-1 and VITA-4 collected from the International Institute for Tropical Agriculture (IITA) and one variety from the Port Harcourt local market was investigated.

Variety 82D – 716 was found to be most resistant with index of susceptibility of 6.7, while variety 84E – 1108 was most susceptible with index of susceptibility of 14.5 to post-harvest infestation by the cowpea bruchid. Seed germinability decreased with insect infestation and shrinkage of the seeds. Varietal resistance appears to depend on a combination of physical and nutritional characteristics.

- NPA 752 Ezeaku, C.A. (1996). Static Coefficient Of Friction Of Grains. On Selected Surfaces.
Maiden National Engineering Conference. Pp. 39-46.

The interaction between grains and the surfaces of a structure as quantified by coefficient of friction must be taken into account when designing grain storage and handling systems.

Accordingly, a tilting table was constructed and used to determine the static coefficient of friction of two varieties each of sorghum, maize and cowpeas at three moisture levels. Surfaces used in the study included glass, metal sheet, parallel grain wood and perpendicular grain wood.

It was observed from the result that static coefficient of friction was generally very significantly affected by all three variable. Grains on wood surfaces consistently developed the highest static coefficient of friction with those on perpendicular grain wood being greater than those on parallel grain wood. Glass and sheet metal surfaces generally exhibited the least frictional property.

For the moisture levels considered, the static coefficient of friction significantly increased with increase in moisture. varietal effect of grains on the frictional property was also significant except for maize

- NPA 753 Ezeaku, C.A.and Akubuo C.O. (1996). Some Mechanical Properties Of Bambara Groundnut.
Maiden National Engineering Conference. Pp. 47-57

The design and evaluation of facilities for harvesting, processing, handling and storing bambara groundnut requires knowledge of the mechanical properties of the crop. Hence rupture force, deformation and toughness of bambara groundnut seeds as affected by moisture content, seed size and loading position were measured using quasi-static compression test

The result showed that the force required to rupture seedcoat generally decreased with in increase in moisture content implying that low moisture seeds are harder. There is a significant difference between the rupture force experienced by the large sized and the small-sized with the large-sized seeds exhibiting greater amount of force especially at low moistures. Seeds loaded in the vertical hilum position generally required higher rupture forces.

For the range of moisture tested, deformation varied significantly increasing with increase in moisture levels. Thus signifies that seeds get softer at higher moistures and hence more susceptible to bruise damage. While the large-sized seeds essentially experienced reater deformation, loading position showed no significant effect on deformation. Toughness measured for all the seeds at the various moisture levels, loading postions

and seed sizes showed no significant difference. Average toughness was however, in a nearly all cases greater for seeds loaded in vertical hilum position.

- NPA 754 Ezeike, G.O.I (1987). Energy Consumption In Rice Processing Operations In Nigeria: Selected Case Studies.
AMA Agricultural Mechanization In Asia, Africa And Latin America. Vol. 18. No.1. Pp. 33-40.

The bulk of energy consumed in agriculture arise from components connected with primary production, processing and transportation, and food preparation and preservation. Energy consumption associated with processing can often be substantial.

This paper deals with a study conducted to determine the energy consumption in post-harvest rice processing operations as carried out in two rice mills in Nigeria, one of which is a modern integrated plant. The experimental designed allowed the energy consumed in each unit operation to be measured. Areas of waste were identified and remedial measures recommended.

The results indicated that about 1286 kWh/t and 1250 kWh/t of milled rice was needed in the semi mechanized and integrated mills, respectively. The food energy ratio (FER) was greater than 2.8 in both industries while the energy ratio, considering the by-products, was 4.0. These indices indicate favourable energies in rice production in the two mills.

- NPA 755 Echendu, C.A.and Ezeipur, N. E. (1998). Consumer Acceptance Of Bread Fruit (*Treculia Africana*) And (*Zeamais*) In Composite Biscuits
Proceedings Of 22nd Annual NIFST Conference. Vol.1. Pp. 17-18.

The results shown that breadfruit at these high levels of supplementation could be used In baking biscuits. However, lower levels of supplementation could be better accepted and still improve the overall nutritional quality of the products.

- NPA 756 Echendu, C.A. (1999). Consumer Acceptance Of Cakes Partially Substituted With Bread Fruit (*Treculia Africana*) And Maize (*Zeamays*) Flours.
Proceedings Of 23rd Annual NIFST Conference. Pp.70-72.

This work has shown that African breadfruit can be used for cakes even at high levels of substitution of wheat flour. This would also improve the nutritive quality of the final product.

- NPA 757 Egbekun, M.K. (1998). Effect Of Germination And Fermentation On The Nutrient Composition And Paste Viscosity Of Sorghum Flour. **Proceedings Of 22nd Annual NIFST Conference**. Pp. 40-41

The result shown that germination and fermentation could be beneficially used to improve the nutritional quality of cereal grains and reduce bulk in infant feeding.

- NPA 758 Egbekun, M.K. (1998). Effect Of Colour On Consumer Preference And Perceived Sweetness Of Akamu. **Proceedings Of 22rd Annual NIFST Conference**. Pp. 9-10.

From the standpoint of the potential consumers colouring makes little or no difference either in consumer preference or perceive sweetness.

- NPA 759 Ego, U. Okonkwo (1999). Effect Of Insect Infestation On The Organoleptic Characteristics Of Stored Cereals Treated With Pepper Fruits Powders(*Dennetti Tripetala* Baker). **Nigerian Food Journal**. Vol.17. Pp. 5-10.

Two major pests of stored cereals in Nigeria, *Rhizoperha dominbica* Fabricius and *Sitophilus oryzae* Linneaus were used in experiments to investigate the effect of *Dennettia tripetala* Baker f. powder on insect infestation and the organoleptic characteristics of stored cereals product. Infestations were achieved by releasing the two insect species either singly or in mixed populations in samples of maize, millet and sorghum. These releases resulted in infestation levels of 25 and 50%. Pap made from infested and uninfested fermented grains treated with *D. tripetala* powder were evaluated

For flavour, off-flavour, sourness and acceptability by a panel of semitrained judges. There were no significant differences in the scores for the organoleptic parameters tested at 25% infestation levels for all three cereal grains products and the scores also did not differ significantly from product from uninfested treated grains. However, at 50% infestation level, scores for flavour, sourness and acceptability of pap of three cereal grains of untreated controls were lower than uninfested and infested treated

grains. Off-flavours were detected in pap prepared from untreated grains infested at the 50% level.

- NPA760 Enjiugha, U.N. and Bedejo, A.A. (1999). Effects Of Changes In The Culture Conditidions Of *Bacillus Subtillis* For African Oil Bean Fermentation.
Proceedings Of 23rd Annual NIFST Conference. Pp. 250-252.

The results of the prevent study show that when culture conditions of *B. subtillis* were altered, the subsequent fermentation of African oil bean seeds was affected. The addition of 5% w/w NaCl concentration did not significantly [$p < .05$] differ from 10% w/w NaCl concentration in terms of effects on the *B. subtillis* fermentation, as can be seen from table 1. this means that the organism produced best fermented product when grown under slight salt stress . .

- NPA 761 Ekesi, S., Onu. I. Akpa, A.D., Dike, M.C. and Maniania, N.K. (1999). Efficacy Of The Entomopathogenic Fungus *Metarhizium anisopliae* For Control Of Maize Weevil, *Sitophilus zeamais* Mots (Coleoptera-Curculionidae)
Nigerian Journal Of Entomology. Vol.16. Pp. 72-81.

The virulence of eight isolates of entomopathogenic fungus, *Metarhizium anisopliae*, to the maize weevil, *Stophilus zeamais*, was bioassayed in the laboratory. All the isolates tested were pathogenic to the weevil but to varying degrees. Isolates ICIPE 45 and 47 were superior to all other isolates in terms of mortality on adult weevils, protection of grains from damage and reduction in progeny production by the weevil. There were no significant differences between Pirimiphos-methyl-treated maize and maize treated with dry conidia of isolates ICIPE 45 and 47 in relation to adult weevil mortality, damage to maize grain and progeny emergency on maize at seven days post treatment. Both isolates persisted for more than six months on maize grain achieving up to 60 to 100% mortality at 7 days post treatment.-

- NPA762 Ekong, U. Okon, Edet, O. Akpanyung (1999). Phytate Oxalate,Hydrocyanate And Mineral Elements Content Of Nigeria.
Proceedings Of 23rd Annual NIFST Conference. Pp. 19-21.

The results further emphasizes the significance of phytate; zinc, calcium; phytate and phytate;iron molar ratios in relation to bioavailability of dietary zinc in larger beers.

- NPA 763 Eleyinmi, A.F. (1999). Studies On The Preservative Effect Of Additives On Non-Alcoholic Pito.
Proceedings Of 23rd Annual NIFST Conference. Pp.12-14.

These result show that at the concentration of the preservative used, the activities of spoilage micro-organisms were effectively curtailed. Good and impressive results were recorded for sodium met bisulphite and sodium benzoate with respect ot nutrient retention and microbiological control.

- NPA 764 Emmanuel Nwokolo (1987). A Nutritional Assessment Of African Yam Bean *Sphenostylis Stenocarpa*(Hochust ex A.Rich) Harms. And Bambara Groundnut *Voandzeia Subterranea* L.)
Journal Of The Science Of Food And Agriculture. Vol.41. No.2. Pp. 123-129.

Two grain legumes *Sphenostylis stenocarpa* (Hochst ex A. Rich) Harms, and *Voandzeia subterranea* L. commonly grown in the tropics for human consumption, were evaluated nutritionally using broiler chick assays. Metabolisable energy content was high in both pulses, but true protein digestability was low in *S. stenocarpa* (62.9%) and moderate in *V. subterranea* (77.0%). Both mineral content and availability were moderate. Amino acid content was similar to that of other pulses, cystine and methionine being low. Amino acid availability differed significantly between *S. stenocarpa* (62.6% and *V. subterranea* (83.0%). Fatty acid composition was similar to that observed in most commonly eaten pulses.

- NPA 765 Emmanuel, S., Ajisegiri, A., Peter, A., Sopade, B. and Adebayo Abbas (1994). Moisture Sorption Study On Nigerian Foods; Kuka.
Journal Of Stored Products Research. Vol.30 No4. Pp. 331-338.

Kuka is an important vegetable in the Nigerian food chain. The moisture sorption characteristics of the vegetable studied at 34, 37 and 45°C between a_w 0.10-0.96, revealed a BET type 11 behaviour. The Kuka exhibited hysteresis and an increase in EMC with increase in a_w and decrease in temperature. Four sorption models (Oswin, Halsey, Kuhn,, and GAB) were studied and the Oswin model was the most suitable. The constants in the Oswin model and GAB monolayer moisture contents were

obtained and found to be temperature-dependent. Heats of sorption were greater for desorption than adsorption and in either mode, they reduced with an increase in moisture content. An exponential equation was obtained to relate heat of sorption with moisture punctured grain, weight loss.

- NPA 766 Enobokhore, D.A. and Law-Ogbomo, K.E. (2002). Reduction Of Post-Harvest Loss Caused By *Sitophilus zeamais* (Motsch) In Three Varieties Of Maize Treated With Plant Products.
Postharvest Science. Vol.1.No.1.pp1-6

The efficacy of five plant products (groundnut cake, palm kernel cake, soya bean meal, Vernonia amygdalena Bitter leaf and Ocimum gratissimum fever plant in reducing post harvest loss caused by Sitophilus zeamais (Motsch) to three maize varieties (“Uselu” local, SUWAN-1 and Oba Super 1 (8321-18) was determined in the laboratory at $30.3 \pm 0.30^{\circ}\text{C}$ and $69 \pm 0.32\% \text{r.h.}$ Each of the plant products was tested at dosages of 1.0g and 2.0g/20g of maize grain in four replications. Each experimental unit had fifteen sexed adult insects.

All the plant product treatments recorded significantly high ($p < 0.001$) mortality of adult weevils (0.00-25.80%) at 21 days after treatment (DAT). Percentage weevil mortality in treated grains was significantly higher than mortality in control. The plant products gave appreciable percentage reduction in percentage weight loss (3.7%) when compared with the untreated control (9.9%). Significant reduction in percentage punctured grain (27.2%) versus 75.8% in control had no adverse effects on seed viability. However, among the treatments, soyabean meal at 2g/20g grain was the most effective in reducing post-harvest weight loss (0.84%). The local variety (“Uselu” local) was more resistant to maize weevil infestation than the improved varieties (SUWAN-1 and Oba Super 1 (8321-18). A combination of soyabean meal with “Uselu” local at the rate of 2.0g soyabean meal/20g grain gave the most effective reduction in Sitophilus population and damage.

- NPA 767 Esuoso, K.O., Kutubuddin, M., and Bayer, E. (1998). Utilization Of Sugarcane By Products.
Proceedings Of 22nd Annual NIFST Conference. Vol.1. Pp.54-55.

The result indicated that all the quality parameters determined on the carbon compared favourably with those of commercial active carbon. Bagasse active carbon had exceptionally high Iodine and methylene blue numbers [1230mg/g and 275 mg] respectively. The

pore surface as indicated by n-hexane adsorption showed that bagasse exhibited a highly developed micro and mesoporous structure [micropore, 0.5 cm³/g; mesopore, 0.2 cm³/g]. This makes it suitable for solving a wide spectrum of adsorption problems

- NPA 768 Etang, B.B., Sokan, T.G. (1999). Hazard Analysis Of Kunun Zaki Prepared And Sold In Uyo Metropolis In Akwa Ibom State, Nigeria. **Proceedings Of 23rd Annual NIFST Conference**. Pp. 31-33.

The critical points for the production process were found to be time of fermentation, usually 9-12 hours and the type of heat treatment after bottling, which was usually not done. Improvement of these two steps, that is reduction of fermentation time to 4-6 hours and pasteurization of bottled products will certainly give a better drink in terms of bacteriological quality and shelf life.

- NPA 769 Etuk, B.R. and Akpan, F.O. (1998). Optimum Drying Temperature Of Sorghum Malt Using A Heated Particulate Medium. **Proceedings Of 22nd Annual NIFST Conference**. Vol.1.p. 1-3.

With sand as the particulate medium, a drying temperature of 40C is recommended for the sorghum variety L.187 in order to produce the sorghum malt of acceptable quality for brewing purposes.

- NPA 770 Ezueh, M.I. (1984). Assessment Of Crops Loss In Cowpea Due To Damage By *Cydia Plyphora* Meyric. **Nigerian Journal Of Entomology**. Vol.5. Pp. 20-24.

Caged experiments indicated that a population level of 6 mated females of *C. ptychora* per 12 plants could cause a seed damage of about 33% resulting in a significant loss in seed weight ($P < 0.01$) of about 21%. There were highly significant correlations between the numbers of infesting females and seed damage and between the numbers of infesting females and loss in seed weight. The relationship between seed damage and loss in seed weight was curvilinear and showed that 10% seed damage would result in about 5.0% weight lost 1000kg ha⁻¹ obtainable under improved management practices.

- NPA 771 Fabian, N.C. Osuji (1982). Radiographic Studies Of The Development Of *Callosobruchus maculatus* Fabricus Coleoptera:Bruchidae In Cowpea Seeds **Journal of Stored Products Vol 18 No1 Pp1-12**

One hundred and sixty-eight cowpea seeds of 4 varieties (PI 229344g, PI 233531, Tvu 37 and ('commercial') infested with *Callosobruchus maculatus* (F.) were radiographed daily to study the development of insects inside. Enlarged photographic prints were made from X-ray radiographs to facilitate interpretation. Strips of the radiographs were also cut and mounted between glass slides for study with a magnifying glass or binocular microscope.

Indications of larval tunnelling were obtained as early as the 5th, 6th, 7th and 19th day in 'Commercial', PI 293531, Tvu 37 and PI29344b, respectively. Typically, three periods of tunnelling, interrupted by brief periods of static tunnel size, could be discerned before the last instar; these were presumed to correspond to larval stadia and moulting times, respectively.

Larval tunnels were observed in the cowpea cotyledons, along the 'check'; other parts of the seed were generally avoided. The fully-grown larva was recognised on the radiographs by its strongly-curved shape, and was observed from about the 18th day in PI 2933531, 19th – 20th day in PI 29293446, and from the 17th day in TVu 37 and 'Commercial'

- NPA 772 Falomo, A.A. (1978). Post Harvest Susceptibility of Maize Varieties to Infestation By *Sitophilus zeamais* Motsch.
NSPRI Technical Report No.6. Pp. 57-63.

Biological technique was used for assessing the susceptibilities of maize varieties to infestation by *Sitophilus zeamais*. Five maize varieties were tested for susceptibility and the results obtained were analysed using an 'Index of susceptibility' which took into account the F1 progeny developing during the tests and the measure of the average developmental were also investigated. The effects of grain hardness estimated by the proportion of flour endosperm were related to susceptibility.

- NPA 773 Falomo, A.A; Okonkwo, E.U., Agidi, L.E. and Okoye, W.I. (1987). The Effectiveness Of Damfin Insecticide For The Control Of Insect Infestation Of Maize Stored In Ventilated Crib.
NSPRI Technical Report. No.3. Pp.31-35.

The dust formulation of Damfin was tested at the dosages of 5ppm, 10ppm, 20ppm, 30ppm and 50ppm, for effectiveness in controlling insect infestation of maize cobs stored in cribs.

All the dosages tested was effective in controlling insect infestations and reducing insect damage to below 20% for two months. Damfin at 50ppm was effective for 4 months in reducing insect damage to below 20%

- NPA 774 Felicia, O. Kuku. (1976). Deterioration Of Melon Seeds During Storage At - Various Relative Humidity.
NSPRI Technical Report. No.14. Pp. 117-119.

Melon seeds were stored at relative humidity's (R.H.) ranging from 65 to 98 per cent to determine the critical level for the establishment of microbiological deterioration.

The seeds stored at 75 per cent relative humidity and above became mouldy while those stored at 65 and 71 per cent did not. It was found that the seed mycoflora varied with the relative humidity of storage

- NPA 775 Gaffa Terna And Abdulraham Musa (1998). Soybeans Yoghurt Production Using Starter Culture From 'NONO'.
Nigerian Journal Of Biotech. Vol.9. No.1. Pp. 17-23.

Yoghurt was prepared from soy-milk equivalent. Soybeans used for milk production were selected, debulled, blended then mixed with water in ratio 1:6 respectively and filtered with a muslim cloth to obtain milk. On kilogram (1kg) of soybeans used produced soy-milk equivalent of six litres (6L) in moderate dilution. Two genera of bacteria *Lactobachillus* and *Streptococcus* were isolated from 'nono'(naturally fermented cow-milk) using the pour plate technique. The soy-milk equivalent obtained was fermented to yogurt at 40°C for 14.5 hours using *Lactobacillus* and *Streptococcus* bacteria as a starter culture in a combination ratio of 1:2. The isolate gave a fine yogurt like product with a characteristic acid flavour, cream odour and custard-like consistency with a pH 4:36.

- NPA 776 Gami, S.Y. (1999). Evaluation Of Selected Food Quality Attributes Of Some Improved Varieties Of Some Nigerian Legumes.
Proceedings Of 23rd Annual NIFST Conference. Pp. 180-182.

This study has shown that cooking of all the legume varieties were improved through soaking and that breeding and selection of soybeans and cowpeas, for small seed size are likely to lead to reduction in cooking times .

- NPA 777 Gbadebo, S.A.O. (1985). Spoilage In Sugar And Confectionery Industries.
Nigerian Food Journal.Vol. 1,2 and 3 pp. 115-118.

The paper highlights factors causing deterioration spoilage of sugar during storage, sources of spoilage in confectionary industry, and preventive measures against spoilage in sugar and confectionary.

NPA 778 George, N. Mbata, Fabian, N.C. and Osuji. (1983). Some Aspect Of The Biology Of *Plodia interpunctella* (Hubner) (Lepidoptera Pyralidae) A Pest Of Stored Groundnuts.

Journal Of Stored Products Research Vol. 19 No 3. Pp. 141-151.

The biology of *Plodia interpunctella* (Hubner) was studied at various combinations of temperature and relative humidity. The incubation period of eggs ranged from 4 to 7 days. Development from laying of egg to adult lasted an average of 50.9 days at 25°C and 60% r.h. and 34.6 days at 30°C and 80% r.h. At 70 and 80% relative humidity, development was faster, more progeny were produced and the moths were heavier than at 60% r.h. Relative humidity had little effect on egg and pupa development.

The larvae were negatively phototactic. However, the rate of development of the strain studied was similar in constant darkness, constant light or in a 12hr-light: 12 hr-dark light system. The adult moths were immobile in diffused daylight. Locomotory activity was markedly high at dusk and was accompanied by an increase in the rate of pairing. Temperatures between 27 and 31°C did not appear to influence locomotory activity.

Cracked groundnuts were more favourable for development than whole nuts which were in turn better than groundnut meal. The weight losses inflicted on infested groundnuts were directly correlated with the total weights of emerged moths and differed according to the treatment given to the medium. Losses in weight of about 8.7 and 8.6% were observed when 1.3 larvae completed development in 30g of whole-nuts and cracked nuts, respectively. Females consumed more food and were heavier than the males. Each larva ate an average of 140mg of whole nuts and 190mg of cracked groundnuts to complete development. The increases in free fatty acid values were not appreciably higher in infested media than in the control. Increases of 17.5 and 18.2 m-equiv of peroxides were observed in infested whole and cracked nuts, respectively.

NPA 779 George, N. Mbata (1990). A Survey Of The Incidence And Abundance Of Insect Pests Of Stored Groundnuts In The Ibadan Area Of Nigeria. **Nigerian Journal Of Entomology**. Vol.11. Pp.75-89.

A survey to ascertain the incidence and relative abundance of insect pests of stored groundnuts was carried out at Sabo Village, near Dugbe Market, Ibadan, between April 1981 and April 1982. The most abundant insect pest was *Tribolium castaneum* (Herbst) which represented 51.9% of insects strapped on the wing and 72.7% of insects sieved from groundnut samples.

Ephestia cautella (Walker) constituted 30.2% of trapped flying insects and 12.0% of insects sieved from samples; *Plodia interpunctella* constituted 11.3% of trapped flying insects and 9.2% of insects sieved from samples; *Corcyrs cephalonica* (Stainton) constituted 5.7% of trapped flying insects and 4.9% of insects sieved from samples; and *Oryzaephilus mercator* (Fauvel) constituted less than 2% of both trapped and sieved insects. The peak of infestation of groundnut samples seemed to precede the peak of flying insects, insects within samples being most abundant by September and October while flying insects were abundant by October and November. The moths *E. cautella* and *P. interpunctella* appeared to be abundant when temperatures were low and relative humidities were high. High temperatures seemed to favour the building up of populations of *T. castaneum*. Free fatty acids and peroxide levels of groundnut samples were determined and used as parameters for assessing the extent of damage of nuts by pests; these values correlated with insect infestation in most cases.

NPA 780 Georgiana, N. Aniche. (1989). Production Of Malt Extract From Sorghum Malt.

Nigerian Journal Of Biotechnology. Vol.2. Pp. 29-30.

Malt extract comparable in property with barely malt extract and acceptable to a food manufacturer was prepared from sorghum. It had the following properties; sugar, 47%, protein, 3.58%, specific gravity, 1.02, ash, 1.40% and colour 140 hazer units.

NPA 781 Giles, P.H. (1964). Lindane Contaminations In Stored Sorghum And Millet In Northern Nigeria.

Tropical Science. Vol.6 Pp. 113-121.

Farmers in Northern Nigeria storing unthreshed sorghum or millet in mud granaries for more than six months have been recommended to use a 'sandwich' treatment of 0.5 per cent lindane dust at a rate of 10 parts per million threshed grain (6.5 p.p.m. unthreshed grain). A series of investigations into the factors reducing lindane residues is described. It has been shown that there is no chance of chronic or acute toxicity or taint at this rate of application. The risks of non-uniformity of mixing,

unwitting repetition of treatment, and overdosing by unsupervised peasant farmers are discussed. It is concluded that if the recommended amount is applied correctly, toxic hazards to consumers are well within acceptable limits.

- NPA 782 Gonap, P.K. (2000). Some Physical And Engineering Properties Of Canarium Oil
Proceedings Of The First International Conference And Millenium General Meeting Of The Nigerian Institution Of Agricultural Engineers. A Division Of The Nigerian Society Of Engineers. Vol.22. Pp. 52-56.

Canarium Oil, vegetable oil from the plant scientifically called Canarium schweinfurthii or commonly referred to as African Olive plant, Pet (Angas), Atile (Hausa) and Uba (Igbo) is found concentrated abundantly around the hill sides of Plateau, Nassarawa, Kaduna and Bauchi States as well as all over Nigeria and Africa. The oil is used for cooking, cosmetics, medicinal, and other industrila purposes. Some of its physical and engineering properties like density specific heat, thermal diffusivly, thermal conductivity and rheological properties were determined. In this work, the oil is found to have an average denity of 920kg/m³. Its specific heat and thermal conductivity increase with increase in the oil temperature while thermal diffusivity is 3.0375 x 10⁻³m²/hr. The viscosity which is a rheological property essential for developing new consumer products and in evaluating and retaining the quality of the final product determined at various temperature was found to be pseudo-plastic. The viscosity falls with increase in both shear rates and temperatures. A working relationship was eestablished for the shear stress and shear rates at all the temperature levels. This oil was discovered to have similar properties with other vegetable oils like Olive Oil and its mass production will help self-sufficiency in the country's vegetable oil and alleviate poverty in the new millenium.

- NPA 783 Halliday, D. (1966). Relationship Between Bicoloured Kernels, Free Fatty Acid And Aflatoxin Content Of Groundnuts.
NSPRI Technical Report. No.6. Pp. 67-69.

Figures for percentage discoloured kernels, free fatty acid content of extracted oil and aflatoxin content of the oil free meal are given in Table 1. Column 2 of Table 1 gives the percentage of the total numbers of samples examine found ot have the percentage of discoloured kernels give in colum 1. Column 3 gives the average free fatty acid content of the samples containing each given

percentage of discoloured kernels, the angles of individual values obtained being given in the following brackets. Column 4 gives the percentage of samples of each specified percentage discoloured kernel content, having aflatoxin contents within the 50-250 microg/kg range. No sample had an aflatoxin content in excess of 250 microg/kg.

- NPA 784 Halliday, D. (1966). A Survey Of The Oil And Free Fatty Acid Content Of Groundnuts Delivered To Oil Mills In Kano.
NSPRI Technical Report. No.7. Pp. 71-74.

There are two important factors which can cause variation in oil content in groundnuts. These are degree of maturity at the time of harvesting and varietal differences.

- NPA 785 Halliday, D. (1966). A Preliminary Trial To Determine The Stability Of Plastic Envelopes For Coverage Of Groundnuts Pyramids.
NSPRI Technical Report. No.5. Pp. 61-65.

It is evident that if envelope coverage for pyramids is introduced it is essential that effective fumigations at the time of coverage should be carried out. It is intended therefore, to carry out urgent investigations to overcome the present fumigation insect survival problem. This will include trials with phostoxin as a possible alternative fumigant to methyl bromide.

- NPA 786 Halliday, D. (1967). Build-up Of Free Fatty Acid In Northern Nigeria Ground nuts.
Tropical Science. Vol. 9 Pp. 211-237.

The storage conditions and their relationship to the factors causing lipolysis in decorticated groundnuts is discussed in relation to Nigeria conditions. Statistics of free fatty acid in Nigerian groundnuts are presented and variations interpreted. Methods by which lipolysis could be reduced in Nigerian groundnuts are suggested.

- NPA 787 Halliday, D. (1967). Lipolysis In Groundnuts Stored In Bulk In Drums.
NSPRI Technical Report. No.7. Pp. 67-71.

It may be concluded that the hypothesis that the rate of lipolysis in decorticated groundnuts stored in bulk under insect free conditions at moisture contents of less than 4 per cent is no greater in broken than in whole kernels, has largely been confirmed. This has great practical significance, and it is hoped to be able to carry out some pilot scale storage trials in silos of 25-50 ton capacity in the near future. It is hoped that if these prove successful, it will be possible to set up a proto-type bulk handling and storage installation at a groundnut storage site in the Northern states of Nigeria.

NPA 788 Halliday, D. and Kasaure, I. (1967). The Aflatoxin Content Of Nigeria Ground nuts Cake.
NSPRI Technical Report. No.8 Pp. 73-78.

There was a general decline in aflatoxin level from 1963-64 to 1966-67. This decline cannot be related to any great extent to activity by the Agricultural extension services in introducing improved cultural and harvesting methods, and it is possibly due to variations in climatic conditions during the pre and post harvesting period. This would, however, be difficult to confirm definitely.

NPA 789 Halliday, D., Kasaure, I. And Qureshi, A.H. (1967). Coverage Of Groundnut Pyramids With Plastic Envelopes.
NSPRI Technical Report. No.9 Pp. 79-97.

It is considered that if envelope coverage were introduced there would eventually be a saving in the numbers of bags requiring replacement due to rodent damage. In addition if the modified envelopes prove to be completely waterproof as expected, it is likely that deterioration due to wetting can be almost completely eliminated. It is possible that savings of up to #50 per pyramid could be made in this respect.

NPA 790 Halliday, D. and Kasaure Isa. (1967). Composition Of Commercial Nigerian Cotton Seed.
NSPRI Technical Report. No.115 Pp. 127-129.

In this connection it has been shown that unwetted cottonseed stored under the very humid conditions prevailing at the port of Burutu for several months, had only achieved a moisture content of 8.4-9.5 per

cent [Cornes and Halliday , 1965]. The low free fatty acid contents reflect the low moisture contents .

- NPA 791 Halliday, D., Kazure, I., Cornes, M.A. and Qureshi, A.H. (1968). Further Studies Of Coverage Of Groundnut Pyramids With Plastic Envelopes. **NSPRI Technical Report. No.4.** Pp.39-44.

In the meantime it is considered that sufficient progress has been made to make a tentative recommendation that envelope coverage be substituted for tarpaulin coverage of pyramids, and that a substantial quality of envelopes be purchased for use in 1970.

- NPA 792 Halliday, D, and Kazaura, I. (1968). Distribution And Concentration Of Phosphine In Groundnut Pyramids Fumigated With Phostoxin. **NSPRI Technical Report. No.5.** Pp. 45-52.

The application of phostoxin tablets does not require the same degree of technical skill which is necessary if an effective methyl bromide fumigation is to be achieved, and this would solve some of the problems posed by the lack of the experienced trained staff to man the now six pest control units in the Northern state. Finally, the use of phostoxin would avoid the necessity to restack the bags at the apex of the pyramid to create a cavity for vaporisation of the methyl bromide.

- NPA 793 Halliday, D. (1968). Composition Of Sievings From Bags Of Groundnuts And Quality Of Oil Extracted From Them. **NSPRI Technical Report. No.2.** Pp. 21-26.

From the quality aspect there would appear to be a slight advantage in installing equipment in Nigerian groundnut oil mills to remove sievable material from the kernels before they enter the expellers. This material could then be processed separately and the low quality oil produced sold for local soap-making. From the commercial stand – point, however, it is considered unlikely that the financial returns from the improvement in quality would justify this procedure, except for consignments of groundnuts containing unusually large amounts of sievable material, e.g., groundnut carried over into the following season. The removal of sievable material would also be expected to reduce plant wear to some extent by removing abrasive mineral dust.

NPA 794 Heape, R.J. (1968). Some Aspects Of The Insect Infestation On Stored Benniseed.

NSPRI Technical Report. No.11. Pp. 81-85.

A summary of the results of the examination of bags of Benniseed at Port Harcourt is given in Table 2. The average numbers of insects given is rather an unreliable figure due to the small number of bags snaked, and the range in numbers of insects seen is likely to be of more importance. Benniseed seen up country was found to be infested with a different range of insects which varied according to the age of the Benniseed after harvesting.

NPA 795 Heape, R.J. (1968). Infestation Of Soya Beans Awaiting Export At Port Harcourt.

NSPRI Technical Report. No.10. Pp.77-80.

The results showing the range in number of insects found in bags of soybeans for each month are given in Table 1. It can be seen that few insects were to be found until the beginning of April, and even after that date some bags [especially those originating in villages off the main trade routes] continued to have only a very light infestation. During June and July all bags sieved were infested with very large populations of insects, the percentage of holed beans giving a rough indication of the degree of infestation. When the number of insects present is put as "Many", it means that there were too many insects present to count properly. This relates especially to *Dinarmus laticeps* [Ashm.] which was often present in thousands. Only small quantities of soybeans were present in the warehouse after June, most of the stocks having been exported by this time, and very often no soybeans were present for sieving.

NPA 796 Henshaw, F.O. and Sanni, S.A. (1995). The Effect Of Seed Physical Properties And Chemical Composition On The Cooking Properties Of Seven Cowpea (*Vigna Unquiculata*) Varieties.

Nigerian Food Journal. Vol.13. Pp. 53-63.

A study to investigate the effects of seed physical properties and chemical composition on the cooking properties of seven different cowpea varieties (TVX 3236, L-80, L-25, IT84E, IT84S-2246, IT86D-715, Ife Brown) was undertaken. Physical properties such as seed size, seed coat colour and

seed ciat textyre varied significantly among the varieties. The rate of water imbibition and hydration index was related to the cooking time, which varied between 33 and 140 minutes. All the chemical components determined; starch, amylose, and protein were positively correlated to cooking time. Cooked seed texture and swelling varied significantly among the varieties.

- NPA 797 Henshaw, F.O. and Sobowale, M.K. (1996). Cowpea Flour Produced From Different Bean Varieties. Functional Properties, Composition and Acceptability Of Products.
Nigerian Food Journal. Vol.14. Pp. 622-71.

The proximate composition and functional properties of flour produced from five cowpea varieties: L-80, L-25, Ife-brown, IT84S-2246 and TVX 2336. Were determined. Flour samples were made into akara (fried cowpea paste) and moinmoin (steamed cowpea paste) and subjected to sensory evaluation.

Limited varietal effect was observed in proximate composition except for ash, which had values ranging between 2.0-3.9%. Protein content ranged between 22-23%, crude fat between 1.6-2.2% and total carbohydrate between 64-66%. Based on the values of coefficient of variation for some functional properties (gelation capacity (14%), foam capacity (17%) emulsion capacity (16%) and nitrogen solubility (29%0, some degree of varietal sissimilarity is indicated. There properties are believed to be important for acceptable qualities of cowpea products susch as akara and moinmoin. There was a significant difference ($p < 0.05$) in overall acceptability of products among varieties.

- NPA 798 Ibrahim, M.H. and Ebo, K.C. (1984). Mycroflora Of Stored Crops From Six Northern States Of Nigeria.
NSPRI Technical Report. No.1. Pp. 25-31.

A survey was carried out on the mycoflora of stored agricultural commodities in six Northern States of Nigeria. Samples of crops were obtained from farm, warehouse and market stores. Seventeen different mould species belonging to the following geneva were isolated: *Alternaria Aspergillus*, *Cephalosporium*, *Cladospoiorium*, *Curvularia*, *Fusarium Helminthosporium*, *Mucor*, *Neurospora*, *Penicillium*, *Phoma*, *Rhizopus* and *Syncephalastrum*.

- NPA 799 Idoko, J.O. (1999). Effect Of Heat Treatment On the Hnemagglutinin Content Of Lima Beans (*Phaseolus Lunatus*).
Proceedings Of 23rd Annual NIFST Conference. Pp. 207-208.

The result explains the fact that haemagglutinin are destroyed by cooking for over an hour at temperature equal to or above 100.^oC.³

- NPA 800 Idowu, A. and Osho, S.M. (1995). A Review Of Experience With Soybeans Food Technology Generation And Transfer In Nigeria.
Post-Harvest Technology And Commodity Marketing. Pp.179-183

The soybean utilisation project aims to determine the status of soybean production technologies and utilization in the project countries, develop technologies and processing equipment, train people in methods of technology generation [research] and technology transfer [extension], and disseminate results to the ultimate users .

- NPA 801 Igwe Chima, C. and Osinowo, F.A.O. (1996). Evaluation Of The Methods Of Essential Oil Extraction.
Nigerian Food Journal. Vol.14. Pp. 78-84.

Two sample of aromatic plant materials [Nutmeg and Black papper] were extracted for essential oils using the traditional methods of extraction, viz; Cold solvent extraction, soxhlet extraction and hydro distillation. Comparisons were made on oils from the three methods based on quality and yield . Cold solvent and soxhlet extractions gave very low yields but low quality essential oil while hydro-distillation gave very low yields but high quality essential oils. Three samples of aromatic plant materials [Lemongrass, Eucalyptus and Black pepper] were also subjected to extraction for essential oil using the traditional hydro-distillation and chilled-water-condensation.

- NPA 802 Igwe, I.O. and Odeh, I.S. (2000). A Study Of Intrinsic Viscosities Of Some Selected Vegetable Oil In Organic Solvent.
Journal Of Chemical Society Of Nigeria Vol.25. Pp. 96-99.

The intrinsic viscosities (η) of the oils of melon seed [*Colocythis vulgaris* Shrad], soyabean [**Glycine max** (L.) Merr] and rubber seed [*Hevea brasiliensis* (Kunth) Muell] were determined in various hydrocarbon and alcoholic solvents. Plots of reduced viscosity versus oil concentrations

were found to be generally non-linear at concentrations less than 5.0 g/dl. Molecular aggregation was suggested to be responsible for this anomalous viscosity behaviour, the extent of which varied, depending on the oil and the solvents. The intrinsic viscosity of oils follows the increasing order in hydrocarbon solvents, that is, toluene, xylene and benzene respectively. Whereas the alcoholic solvents did not show any meaningful order

- NPA 803 Igyor, M.A. (1999). Effect Of Malting Temperature And Mashing Methods On Sorghum Wort Composition. **Proceedings Of 23rd Annual NIFST Conference**. Pp. 52-54.

While malting temperatures had little effect on the wort composition, the different mashing methods gave worts of varying compositions. With appropriate mashing methods, sorghum malts can produce worts of appropriate composition for quality larger production.

- NPA 804 Ihekoronye, A.I. (1987). Nutritional Quality Of Acid-Precide Pilated Protein Concentrate From The Nigeria Red Skin Groundnut (*Arachis Hypogaea* L). **Journal Of The Science Of Food and Agric. Vol.38. No.1**. Pp. 49-56.

Groundnut protein concentrate (GPC) prepared by isoelectric centrifuging at pH 4 was subjected to treatment with 0.12M hydrogen solubility, in-vitro digestibility, amino acid composition and enzymic protein efficiency ratio (E-PER) were compared with those of untreated concentrate. The nitrogen solubilities were markedly lower at acidic pH but comparable to values obtained from untreated samples at alkaline pH; the digestibilities ranged from 71.4 to 92.1% in treated samples and from 73.7 to 98.0% in untreated samples. There was a marked reduction in the content of threonine, proline, cystine, methionine and tryptophan, which was reflected in the lower E-PER value for the treated samples. Despite these changes, peroxide-treated PC is a potentially useful supplement to many cereal-based Nigerian weaning foods and breakfast preparations.

- NPA 805 Iloba, B.N. and Osuji, F.N.C. (1986). Light And Oviposition In *Callosobruchus maculatus* (Fabricius). **Nigerian Journal Of Entomology. Vol.7**. Pp. 14-17.

Studies on the influence of light on the distribution of eggs in ovipositing female *Callosobruchus maculatus* showed that they preferred dark to lit

conditions and that fewer eggs were laid on the lit upper surface of cowpea seeds than on the lower surface. Fewer eggs were also laid with an increase in photoperiod. These observations can be exploited in designing better storage systems for protecting cowpea against *C. maculatus*

- NPA 806 Ishiwu, C.N. and Obiagwu (1999). Effect Of Trona On The Physico Chemical Properties Of Soybean Milk.
Proceeding Of 23rd Annual NIFST Conference. Pp. 204-206.

The results of the sensory evaluation of the samples show that there was a significant difference [$p > 0.05$] in the flour of the samples, since no beany flour was preserved in TSM while SM exhibited a strong beany flour which made the panellists to score it very low.

- NPA 807 Igbeka, J.C. and Olumeko, D.O. (1996). An Appraisal Of Village - Level Grain Storage Practices In Nigeria.
AMA. Agricultural Mechanization In Asia, Africa And Latin America. Vol.27. No.1. Pp. 29-33.

Grain storage practices at village-level in Nigeria vary according to the climatic zone and the socio-economic level of the inhabitants. A survey was undertaken to appraise these practices. The country has three climatic zones: the sudan savanna, guinea savanna, and the rain forest zones. These represent the north, middle belt and the south, respectively.

Results show that the performances of existing storage structures in the country were not satisfactory. The main structures were mud rhombus, thatched rhombus, underground pit, vertical poles, gourd, earthen pots and bag and plastic containers. Most of the structures were not moisture – and rodent-proof, and were without adequate inlet and outlet facilities.

The suggested improvements included the following, among others: Discontinuation of the thached rhumbu due to high rates of pest and rodent infestation and constant fire occurrence; provision of the mud rhumbu with strong elevated base and inclined steel outlet with application of water proof mud plaster; replacement of existing underground reinforced concrete or brick masonry structures; and ventilation of the local crib and keeping the width at 0.7 m or less.

- NPA 808 Job Nda Nmadu (1996). Gross Margin Analysis Of Using Neem Seed Extract to Control Cowpea Pest At Bida - Nigeria
Maiden National Engineering Conference. Pp. 58-62.

Investigations were carried out to evaluate the profitability of an alternative method of pest control – neem seed extract (NSE) In cowpea production at Bida (9.06N) and 5.59E during the 1994 and 1995 cropping seasons. The results obtained were compared with the performance of a conventional agrochemical – Nuvacron. Results obtained show that there were significant difference between the yields obtained from the two control methods at 5% level of significance. Also 3.33% w/v of NSE and 0.2% v/v of nuvacron gave best yields of 712.60 kg/ha and 1165 kg/ha respectively. These results translate to gross margin of N10.993.19 and N19.637.99 respectively. It is recommended that each farm family should own at least one neem tree.

- NPA 809 Jideani, V. A. [2001] Quality Characteristics Of Fura 11; Of Effect Of Different Local Cultivars Of Pearl Millet Flour On Fura Quality. **Proceedings Of The 25th Annual [NIFST] Conference.** Pp25-27.

Although there was no difference in hue among the fura samples. the fura made from dauro and gero had a yellowish colour whereas the fura from gayamba gave a yellowish green colour. The chroma for fura from dauro and gero suggests a less vivid colour, whereas that of gayamba suggested a more vivid colour. Hence, in quality control and for the consumer, a fresh fura colour should be yellowish-green to dark colour without any colour tinges.

- NPA 810 Jideani, V.A., Durojaiye, O.O. and I.A. Jideani (1995). Shelf-Life And Predominating Microflora Of A Non-Fermented Pearl Millet Dough (Fura). **Nigerian Food Journal. Vol.13.** Pp. 83-93.

A pearl millet dough product (Fura) was produced without chemical additive (FWA), with Benzoic + citric acid (FBC) and with sucrose + citric acid (FSC), as additives. Microbiological characteristics and chemical quality were investigated during storage for 6 days at $30 \pm 1^{\circ}\text{C}$. The bacteria isolated from FWA on the first day of production belonged to the genera *Bacillus*, *Staphylococcus* and *Enterobacter*. During storage *Fusarium culmorum*, *Aspergillus oryzae*, *clavatus*, *flavus*, *parasiticus* and *Mucor racemosus* predominated. Bacteria and fungi were not detected in FBC and FSC on the first day of production. During storage, *Enterobacter* was isolated from FBC while *Staphylococcus* and *Enterobacter* was isolated from FSC. There was an increase in acidity and oxidative rancidity of FSC and FWA samples during storage. Aroma and colour of FWA was significantly different from FSC and FBC ($p < 0.05$)

and were unacceptable after storage for 1 day. PH, titratable acidity, 2-thiobarbituric acid test (i.e., TBA number) and organoleptic parameter of aroma, appearance and overall acceptability indicate that the shelf-life of fura produced using sucrose + citric acid was extended by 1 day and that produced using benzoic acid + citric acid as additives was extended by 5 days

- NPA 811 Jideani, V.A., Durojaiye, O.O. and Jideani, I.A. (1995). Moisture Sorption Isotherm Of Intermediate Moisture Millet Dough. **Nigerian Food Journal. Vol, 13** Pp. 94-104.

'Fura' was produced and treated with different chemical preservatives as in intermediate moisture foods. One batch (A) was treated with benzoic acid, citric acid, sodium nitrite and sucrose, while another batch (B) was treated with benzoic acid, citric acid, sodium nitrite and sodium chloride. Untreated fura was labelled C. The moisture adsorption isotherms of the products were determined using the static method of saturated salt solutions at 25° and 35°C. The equilibrium moisture content at water activities up to 0.60 decreased as the temperature was increased. At higher water activities the moisture content increased sharply as the temperature was increased, resulting in crossing of the isotherm curve for sample A. The experimental data fitted well with the Oswin and GAB equations, and best with the Iglesias and Chirife equation. There was no significant difference ($P \leq 0.05$) between the samples in taste, texture and colour. The chemical preservatives produced an intermediate moisture fura that remained shelf stable for three weeks.

- NPA 812 Jideani, V.A., Otolowo, D. and Jideani, I.A. (1999). Soybean Processing. A Correct Perspective. **Proceeding Of 23rd Annual NIFST Conference.** Pp. 209-213.

When traditional foods are fortified with soybean products the protein requirements of both the children and the adults will be met. Soy milk is considered particularly vital for infants and there are many of them in Nigeria who are allergic to cow's milk or whose families cannot afford cow's milk. We are certain that soybeans are the answer to the malnutrition problem of Nigeria and indeed Africa.

- NPA 813 Jideani, I.A., Owusu, R.K. Apenten, and Muller, H.G. (2000). Solubilisation And Reductive Alkylation Of Proteins From A Tropical Cereal *Digitaria Exilis* Stapf-Acha. **Nigerian Food Journal. Vol.18.** Pp. 1-11.

Storage proteins from a methionine-rich tropical cereal *Digitaria exilis* stapf [acha] were fractionated by sequential extraction and reductive alkylation. The total extractable acha protein was 70% [w/w] compared to 55% [w/w] extractable protein obtained by Osborne fractionation. Sodium dodecyl sulphate-polyacrylamide gel electrophoresis [SDS-PAGE] analysis showed that the major storage protein subunit in acha varieties had a relative molecular weight [Mr] of 20,000+1,400. This subunit was absent in other tropical cereals [millet, sorghum, and rice] and durum wheat. The average hydrophobicities for prolamin [952 cal] and acha glutelins or digitenin [923 cal] were within the range reported for other cereals. A residue protein subunit from acha [Mr =60,000], notable for its resistance to a wide range of solvent extraction procedures, was extracted following reductive alkylation. It is concluded that the marked insolubility of acha storage proteins is a consequence of the amounts of sulphur containing hydrophobic amino acids in acha protein. A mode of acha protein subunit organisation is proposed.

- NPA 814 Joseph, J.K., Belewu, M.A. and Kowale, O.A. (1999). Effects Of Baobab Fruit Pulp Flour And Sources Of Milk On Chemical And Sensory Quality Of Fura De Nono (Nigerian Fermented Milk Spiced Millet Beverage). **Proceedings Of 23rd Annual NIFST Conference.** Pp. 15-18

The source of milk and addition of Baobab fruit pulp flour had no significant effect [$p > 0.05$] on the appearance of 'Nono' or Fura-de-Nono. But the addition of Baobab fruit pulp flour had significant effect [$p < 0.05$] on the flavour and overall acceptability of 'Nono' and Fura-de-Nono' with the 'Nono' or Fura-de-Nono' spiced with Baobab fruit pulp flour more acceptable to the panellists. The result also indicates that the overall acceptability of the products is highly dependent on the flavour.

- NPA 815 Julius, I. Olonfa and Wilson, O. Erilitun. (1988). Laboratory Evaluation Of *Piper Quineesc* For The Protection Of Cowpea Against (*Callosobruchus maculatus*). **Insect Science Application. Vol.9. No.1.** Pp. 55-59.

The efficacy of the powder and volatile oil of *Piper guineense* Schum & Thohn at protecting cowpea against seed beetle, *Callosobruchus maculatus* (F.) was tested in the laboratory. At low concentrations the powder significantly reduced oviposition and adult emergence while oviposition was completely suppressed at a higher concentration of 42%.

The same concentration provided adequate protection for the same amount of cowpea placed in containers of different volumes. The powder, however, did not show any fumigant effect. Volatile oil at 0.002 and 0.005% significantly reduced oviposition and adult emergence, while oviposition was completely suppressed at 0.02% and above. Weight loss of seeds at 90 days after treatment with volatile oil decreased as concentration of the oil increase. The practical significance of the results in small scale storage of cowpea is discussed.

NPA 816 Kling, J.G., Yallou. C.G., Kossou, D.K., Okoruwa, A.E. and Akintunde, A.O. (1995). Development Of A High Yielding Maize Variety With Good Dry Milling And Storage Properties In Benin Republic. **Post-Harvest Technology And Commodity Marketing**. Pp. 199-207.

In coastal areas of west Africa, many farmers grow local maize varieties despite the availability of improved varieties which have greater disease resistance and yield potential. Local varieties are preferred because they mill easily, produce a fine flour suited to local food preparation, and generally have good husk cover which reduces weevil damage during storage. In order to combine the desired attributes of both traditional and improved varieties, a composite population was formed by crossing the local varieties Gbogbe from Benin with the improved varieties TZSR-W-I followed by one backcross to TZSR-W-I. Selection for husk cover, yield, and agronomic traits was practice for several year . In 1994 a preliminary assessment of grain quality of 286 full-sib families was carried out by dissecting 5 kernels from each field plot and visually scoring the percentage of floury endosperm. Based on these scores and overall field performance, a selected group of 98 families was sampled for further evaluation of grain quality . significant differences was observed among the families for the stentvert Hardness Test, percent floaters, grit yield, and particle size distribution of the flour, showing that it is possible to detect differences in grain quality among segregation family a common genetic background in a breeding program. Field trials carried out in 1995 showed that the composite population had better husk cover and similar yield potential to other elite, improved –pollinated varieties . Screening for resistance to weevils of segregating families is underway. Results suggest it is possible to combine the desired characteristics of local and improved varieties provided that crop productivity and postharvest quality are combined as breeding objectives.

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PA 817

Kinsley, M.O. (1995). Effect Of Processing On Some AntiNutritive And Toxic Components And On The Nutritional Composition Of The African Oil Bean Seed(*Pentaclethra macrophylla* benth).

Journal Of Science Food Agriculture.Vol.68 No2 Pp. 153-159.

Meals of raw, cooked and fermented oil bean samples of African oil bean seeds (*Pentaclethra macrophylla* Benth) were analysed for proximate composition, mineral content, presence and levels of trypsin inhibitors, tannins, phytic acid, cyanide, aflatoxin B₁ and B₂. The moisture content of the raw samples was 275.0 g kg⁻¹ as is and on a dry matter basis the beans contained (g kg⁻¹) 26.0 ash, 255.0 protein, 462.0 fats, 71.0 fibre and 186.0 carbohydrate. Compared with raw samples the fermented material (ugba) had significantly (P< 0.05) higher moisture (440 g kg⁻¹ as is), fat (612.0 g kg-DM) and significantly (P< 0.05) lower protein (228.0g kg⁻¹ DM) ash (132.0 g kg⁻¹ DM) and carbohydrate (186.0 g kg⁻¹ DM). Minerals in raw seed were (g. kg⁻¹ DM) phosphorus (3.0), calcium (1.0) magnesium (2.0), potassium (6.5), sodium (455.0), magnese (25.3), iron (19.0), copper (27.0) and zinc (42.0). Except for zinc and calcium the minerals were leached significantly (P< 0.05) during cooking and fermentation. Quantities of manganese, copper and zince in ugba appear adequate for dietary purposes. Trypsin inhibitor activity of raw beans decreased during cooking by 98% while fermentation increased the activity of the cooked sample by 1%. Phytic acid and tannins were significantly reduced (P< 0.05) during processing. No cyanide or aflatoxins B₁ and B₂ were detected

NPA 818

Lale, N.E.S. and Abdulraham, H.T, (1999). Evaluation Of Neem (*Azadirachta Indica* A.Juss) Seed Oil Obtained By Different Methods And Neem Powder For The Management Of Ulatus(F) (Coleoptera Bruchidae) In Stored Cowpea.

Journal Of Stored Products Research. Vol.35. Pp. 135-143.

Neem seed oil obtained by extraction with analytical grade acetone using a Soxhiet apparatus, (NSO(S) and that obtained by the traditional kneading method, NSO(K.) were compared with the powder equivalent weights (PEW, the neem seed powder capable of yielding the equivalent amounts of the oil used for the treatments]for their relative efficacy in reducing the reproductive potential of the of cowpea seed , bruchid. *Callosobruchus maculatus* in stored cowpea. Also, neem seed oil obtained by cold extraction with analytical grade acetone, NSO[C] was compared with NSO(S) and NSO(K) for their relative effectiveness in suppressing populations of *C. maculatus* in cowpeas treated before or after eggs had been laid on them. The two NSO[formulations, NSO (S) and NSO(K) were significantly more effective in reducing oviposition and adult emergence than the neem seed powder formulation. At 50 mg/5 g seed

and higher dosages the three extracts of NSO significantly reduced egg-laying and adult emergence in pre- and post-oviposition treated cowpea.

- NPA 819 Lale, N.E.S. and Yusuf, B.A. (2001). Potential Of Varietal Resistance And Piper Gumeese Seed Oil To Control Infestation Of Stored Millet Seeds And Processed Products By *Tribolium castaneum* (Herbstt). **Journal Of Stored Products Research Vol.37**. Pp. 63-75.

Three grain forms (whole grains, broken grains and wholemeal flour) of three improved varieties (ICMV-N89305, GB8735 and Sosat) developed at ICRISAT (Patancheru, India), one cultivar which originated in Zimbabwe (Zimbabwean dwarf) and two local cultivars (Ex-borno and Gwagwa), of pearl millet were compared for their susceptibility to the rust-red flour beetle (*Tribolium castaneum*) under tropical storage conditions. The biological effects of *Piper guineense* seed oil were also investigated on *T. castaneum* confined on similar forms of millet (Ex-borno) contained in ventilated or unventilated devices. Mortality of adult flour beetles was significantly higher on whole grains of GB8735 (99.7%), Zimbabwean dwarf (52.7%) stored in a similar device. The number of adult progeny was significantly higher in wholemeal flour than in broken grains; the number in broken grains was significantly higher than that in whole grains. Development of the beetle was significantly longer in GB8735 than in Zimbabwean dwarf and the overall susceptibility of Zimbabwean dwarf was significantly higher than that of ICMV-N89305. Susceptibility of the cultivars increased with decreasing grain particle size; susceptibility indices for the whole grains, broken grains and wholemeal flour were 2.52, 12.14 and 14.16, respectively. Significantly fewer beetles developed in grains/products treated with *P. guineense* seed oil than in untreated grains/products. The unventilated glass jar retained the biological efficacy of the two lower dosages (20 and 40 mg/10g) of *P. guineense* seed oil significantly more than the ventilated clay pot or polypropylene sack.

- NPA 820 Lasekan, O.O. and Lasekan, W.O. (1997). Comparative Study Of Experimental Beers Brewed From Sorghum And *Vernonia amygdalina* On Hop Extracts. **Nigerian Food Journal. Vol.15**. Pp. 15-23.

The brewing qualities and amino acid profiles of sorghum-derived beer drinks produced with hop and *Vernonia amygdalina* ('Bitter leaf') were compared. The alcohol content (3.9-4.0%), apparent extract (1.6-1.7°P), colour (11.4-11.5°EBC), real extract (3.5-3.6°P), apparent degree of fermentation (68.5-87.5%), and real degree of fermentation (69.5-70%) of

the ‘bitter leaf’ extract (BLE) flavoured sorghum beer were essentially similar to those of hopped beer and that of a commercial barley beer seventeen free amino acids were found in both beer samples. Isoleucine, leucine, alanine, phenylalanine, tyrosine, histidine, glutamine and proline were the major free amino acids. BLE-flavoured sorghum beer was rated the same as hopped sorghum beer in terms of flavour, bitterness, colour and foam formation by a sensory panel.

NPA 821 Mohammed, K. M. (2003). Performance Evaluation Of A Melon Shelling Machine.

Proceedings Of The 4th International Conference And 25th Annual General Meeting Of The Nigerian Institution Of Agricultural Engineers. Vol.25. Pp. 192-200.

Performance evaluation was carried out on an electric motor powered melon-shelling machine. The machine was evaluated for its performance in terms of shelling efficiency, percentage of unshelled seeds and percentage of breakage. The results of 46.3%, 10.2% and 8.3% were obtained when the melon seeds wetted for 90 min. at moisture content, m.c, of 14.7%. The capacity of the shelling machine is 6.6kg per hour.

NPA 822 Maduekwe, B.O. and Umechruba, C.I. (1992). Evaluation Of Classical Seed Health Testing Methods For The Defection Of Cowpea Seed Borne Fungi.

Nigerian Journal Of Botany. Vol.5. Pp. 119-124.

Classical seed health testing methods (blotter, aga-plate, deep-freeze and ragdoll) were evaluated for use in routine seed health testing for the detection of important seed-borne fungi in cowpea seeds [*Vigna unguiculata. Unguiculata* (L.) Walp] local variety “Akidi”. Six cowpea seed samples naturally infected Awka, Enugu, Nsukka, Ugwuoba and Umudioka) in Anambra and Enugu States of Nigeria were used in the study. The blotter and the agar-plate methods were found to be better than the deep-freeze and the ragdoll methods in the detection of *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus terreus*, *Fusarium moniliforme*, *Macrophomina Phaseolina* and *Penicillium sp.* The blotter method was the only method that detected *Curvularia lunata* (0.5%). One percent chlorine pretreatment of seeds for 5 minutes significantly ($P = 0.05$) reduced the percentage incidence of all the seed-borne fungi in each method when compared with the controls. The blotter and ragdoll methods were significantly ($P = 0.05$) better than the agar plate method in percentage seed germination in both chloride pretreated and untreated seeds. The blotter method was found to be better than the other methods.

- NPA 823 Maliki, K. (1999). Investigation Of Storage Stability Of "Kokoro"(a maize based snack)
Proceedings Of 23rd Annual NIFST Conference. Pp. 58-60.

From the results of analysis there was no significant change in fat content in samples kept in sealed packaging and stored under low temperature though there were changes after 14 days storage, in samples kept in the sealed packaging. Fat content decreased in samples kept at ambient temperature in unsealed packaging which is due to breakdown of fat to fatty acids. This equally affected the taste of the product. Samples kept at ambient temperature in unsealed packaging had increased moisture content, than the samples kept at low temperature. This is characteristic of dried food product kept at ambient temperatures and exposed to the atmosphere, which absorb moisture from the air. The crispness was equally affected. The unsealed samples kept at ambient temperature had increased in protein from 9.3% to 10.1% due to mold growth. There was a decrease from 9.3% to 9.0% protein in the sealed packaging kept at ambient temperature because of protein degradation. This was reflected in the sensory evaluation results.

- NPA 824 Mokuoluola, W.A. and Odebiyi, J.A (1985). Post-Harvest Infestation Of Maize (*Zea-mays*) Varieties By *Sitophilus zeamais* (Mots)
Biology Africana: Vol.2. No.1 Pp. 58-68)

Seventy-seven maize varieties consisting of 17 improved and 60 local varieties were screened in a crib for their relative resistance to *Sitophilus zeamais* Mots at ambient temperature and relative humidity. The varieties were rated after 50 days and 5 months of crib storage.

Fourteen varieties, including 2 improved (farz 1, farz 23 and farz 34) and 11 local (Ifunpa, Kuru, Ekpoko, Asaba, Ikorodu, Ashipa, Badagry, Ikeja 2, Ununachi, Afo and Basambra) varieties were relatively resistant after five months of storage.

- NPA 825 Mashi, D.S. and Chinbekujwo, I.B. (1999). A Preliminary Study of Mycoflora of Stored Maize In Jimeta Main Market In Adamawa State, Nigeria.
BioScience Research Communications. Vol.11. No.3. Pp. 199-201.

An investigation was carried out on the mycoflora associated with stored maize in Jimeta Main Market. Six fungal species were isolated which include *Aspergillus flavus*, *A. niger*, *Botryodiplodia theobromae*, *Cladosporium sp.*, *Fusarium moniliforme* and *penicillium sp.* *A. flavus* and *F. moniliforme* were the most frequently encountered pathogens. The survey reveals that fungal infection of maize seed was higher during the rainy season than the dry season. It is also found that there is a relationship between moisture content and degree of mouldiness

- NPA 826 Macdonald, D., Brook, J.A. (1963). Growth Of *Aspergillus flavus* And Production Of Aflatoxin In Groundnuts Part 111. **Tropical Science. Vol.5** . Pp.208-214.

Samples of Spanish 205 groundnuts from a series of drying trials conducted at Mokwa, Northern Nigeria, in 1961, were tested for aflatoxin and it was found that some toxicity occurred in sun-dried materials, while material that had been artificially dried shortly after lifting, was free from the toxin.

Further trials in 1962 with the variety Samaru 38 showed that there were considerable differences in Kernel contamination with *A. flavus* and other fungi between samples taken at different stages in the drying processes but no aflatoxin was found in any of the samples tested.

- NPA 827 Mejule, F.O. (1983). Evaluation Of Chlorpyrifos-Methyl For The Control Of Insects Of Stored Maize. **NSPRI Technical Report. No.4**. Pp. 43-47.

The emulsifiable concentrate of Chlorpyrifos – Methyl was applied at different dosages of 5-20 ppm to samples of maize which were stored for a period of nine months.

The insect infestation, kernel damage, weight/volume ratio, weight of frass and moisture content of the maize were analysed before storage and every three months during storage.

After six months of storage the number of living insects in the untreated grains was eight hundred (800) while it was not more than one in all the treated grains. The percentage kernel damage was less than 5 in the treated grains while it increased to 97.3 in the untreated grains.

All the dosages of chlorpyrifos-methyl that were applied to maize remained very effective for over a period of 6 months.

NPA 828 Mejule, F.O. (1984). Storage Of Cowpeas In Air Tight Containers For Domestic Use.
NSPRI Technical Report. No.5. Pp. 55-61.

The efficacy of storing cowpeas in some air-tight metal and plastic containers was studied. The containers used were filled with cowpeas and were properly sealed with their lids. The percentage kernel damage, the number of insects, the bulk density and the percentage moisture content of the cowpeas stored were determined before and after each storage period.

Also at the end of each storage period the cowpeas in some containers were aerated for a month and the above parameters assessed.

The results showed that the cowpeas in air-tight containers stored better than those in ventilated containers. Also, although all the insects were not killed, their activities were reduced. The metal container gave better results than the plastic containers.

NPA 829 Mejule, F.O. and Oloyede, V.A. (1985). Comparison Of The Effectiveness Of Chlorpyrifos Methyl And Pirimiphos-Methyl For Treatment Of Maize.
NSPRI Technical Report. No.1. Pp. 27-30.

The dust formulation of Chlorpyrifos – Methyl and Pirimiphos – methyl were applied on maize on the cob at the dosage rate of 10ppm. The maize were stored in modified cribs for a period of 6 months.

The assessment of the effectiveness of the insecticides was based on the number of insects and percentage kernel damage of the samples collected from the cribs monthly.

At four months of storage, the number of insects sieved out of the samples from each treatment were 44 for pirimiphos methyl and 129.5 for chlorpyrifos-methyl. The percentage kernel damage were 3.8 and 19.5 respectively.

NPA 830 Mofio, M. and Mohammed, A.L. (1997). The Biochemical Analysis And Nutritive Value Of Soy Bean Milk (Samsory 11).
Proceedings Of 28th Annual Conference Nutrition Society. Pp. 31-33.

An investigation to determine the nutritive value of soybean milk was carried out by estimating the protein, carbohydrate and lipid content. The analysis showed the protein value to be 5.6%, carbohydrate 2.9 and lipid 1.4%. Some of the amino acids detected in the milk include tryptophan and tyrosine which are essential amino acids. Inorganic phosphorus was also detected. The nutritive value of soybean milk as a weaning food and

source nutrient for adult are discussed

- NPA 831 Mofio, B.M. (1997). The Effect Of Cooking On The Saponin Content Of Guinea Corn(Sorghum Bicolor). **Proceedings Of 28th Annual Conference Nutrition Society Of Nigeria.** Pp. 45-47.

The effect of cooking (boiling) process on the saponin content of guinea-corn (Sorghum bicolor) was studied. Saponin was extracted and purified from the guinea-corn both in the raw state and at various stages of cooking. The saponin content of the raw samples and samples at various stages of cooking viz 15,25,35 and 45 mins were found to be 1.68, 1.29, 0.69, 1.36 and 1.54 g/kg respectively. Thus, saponin content of each of the cooked samples can be approximated to about 1.00g/kg. This indicates that the saponin content of guinea-corn at different stages of cooking probably remained constant. The melting points of these saponins were found to be in the range of 200-288°C.

- NPA 832 Morah, S.C. (1974). A Comparison Of Two Techniques For Testing In The Laboratory The Susceptibility Of Maize Varieties To Infestation By *Sitophilus zeamais* (Motsch). **NSPRI Technical Report.** No.4. Pp. 45-50.

In this test, a laboratory method where the F.1 generated adults were counted was compared with the "Ashman Simon" hidden insect detector. The comparison took place using five varieties of maize. Count based on the "Ashman Simon" test paper by examining the purple stains consistently gave a lower count than the laboratory count of emerged adults. The average reduction over all varieties was 34.4 per cent but the range of reduction was from 61.7 per cent to 11.2 per cent over the five samples. Reasons are discussed for the variations

- NPA 833 Morah, S.C. and Cornes, M.A. (1976). A Study Of The Infestation And Pest Control Effect On Groundnuts Stored In Standard Pyramids In Kano. **NSPRI Technical Report.** No.6. Pp. 69-77.

Three pyramids were studied from February to August using groundnut oil traps. All three were treated at the base with 5% iodophenphos dust soon after the start of sampling. The fall in numbers of Parasites and *Rhyparochromus littoralis* Dist. followed the application of pesticide. *Tribolium castaneum* Herbst.and *Oryzaephillus mercator* Oliv. maintained high numbers throughout the season with much less variation. Climatic effects on insect population are also discussed.

- NPA 834 Morah, S.C. and Mbata, G.N. (1982). Assessment Of The Relative Susceptibility Of Some Maize Varieties To Post-Harvest Infestation By The Maize Weevil, *Sitophilus zeamais* (Motsch). **NSPRI Technical Report**. No.5. Pp. 63-68.

Sixteen Maize varieties released for propagation by Nigerian breeders were screened in order to evaluate their susceptibilities to post-harvest infestation by *Sitophilus zeamais* (Motsch).

Bornu local and Composite A were found to be the most susceptible varieties having Indices of Susceptibilities 11.1 and 10.8 respectively. Bulk 3, N. S.I., Early Flint, Biu Yellow, 096, line 7, N.C.B., Earfro 231, Tuxpeno, N.C.A., Composite B, and Colombian Composite with susceptibility indices ranging from 9.2 to 10.6 were not significantly different from one another and were considered to be moderately susceptible. C-10 had the lowest susceptibility index of 7.9 and was considered to be most resistant to infestation by *Sitophilus zeamais*.

- NPA 835 Ndams, O.N. and Williams. J.O. (1987). Determination Of Optimum Quality Of Grain And Exposure Time For The Disinfestation Of Stored Products By Cold-Shock Treatment. **NSPRI Technical Report**. No.1. Pp. 19-22.

Both adults and immature of several species of stored products insects in different sizes of grain were exposed to freezing temperatures between 3.8°C and -10°C for 48 hours and 72 hours in order to determine the effect of cold-shock treatment as a means of disinfesting stored products. While 48 hours cold-shock period is sufficient for eliminating insects in 20kg lot of grain, 72 hours is required for 30kg lot. A longer exposure time would be needed for 40kg lot. Infestation including *Trogoderma granarium* cannot be controlled by these exposure periods immatures of insects within the grain cannot be eliminated by cold-shock for 48 hours in 40kg grain. At 72 hours only the immatures of *S. zeamais* were killed. The implication of using cold-shock treatment in insect pest control in stored products on a large scale is discussed

- NPA 836 Ndiovu, T.M. and Giga D.P. (1988). Studies On Varietal Resistance Of Cowpeas To The Cowpea Weevil *Callosobruchus rhodesianus* (Pic.) **Insect Science Applic.** Vol.9. No.1. Pp. 123-128.

Eighteen cowpea varieties were evaluated for their resistance to cowpea weevil, *Callosobruchus rhodesianus* (Pic) infestation. The experiments were conducted at 27°C and 65-70% r.h. The varieties showed a

differential response to infestation by *C. rhodesianus* with respect to oviposition, egg hatch, adult emergency, adult survival and development period. The intrinsic rates of increase and the indices of susceptibility of the varieties were estimated. The varieties were categorised into three groups of susceptibility (low, medium and high) to *C. rhodesianus* infestations based on the adult survival data. IT 82D-1064 and IT 81D-1032 were the least susceptible varieties.

- NPA 837 Nduka Okafor (1986). Prospects And Challenges Of The Use Of Local Cereals And Starchy Substrates In Brewing Now And In The 21st Century. **Nigerian Journal Of Biotechnology. Vol.2.** Pp. 1-8.

The paper highlights the extent of the use of local materials in brewing at present changes of the 21th century and factor influencing the use of the local substrates as a brewing materials

- NPA 838 Njike, M.C. .Mba, A.U. and Oyenuga, V.A. (1975). Correlations Between Chemical And Biological Methods For Evaluations Of Protein Quality Of Soya Bean Meal (*Glycine maximerr*) Given Varying Heat Treatments. **Ghana Journal Of Science. Vol.15,** pp. 181-186.

Several chemical techniques, urease activity dye absorption and nitrogen solubility tests were supplied to soya bean heated at 121°C for 0, 5, 10, 20, 25, 30 and 60 minutes respectively and correlations were determined between values obtained by biological methods, weight gain, net protein utilization (NFU), biological value (BV). Protein retention efficiency (PRE) and those obtained by chemical methods. Results indicate that changes occurring during heat treatment that lead to decrease or improvement in the nutritive value of meals could be followed by chemical tests. The urease activity test was fund to correlate well with all the biological parameters eexamined. Some correlations were also observed between the results of the other three chemical tests and the biological procedures. NPU and BV appeared to be the best biological tests for correlating chemical tests and nutritive values in this type of study.

- NPA 839 Njoku, J.I. and Itেকে, B.A. (2001). Development Of Fludized Bed Driers For Grains And Powered Food Items. **Proceedings Of The International Conference And Annual General Meeting Of The Nigerian Institution Of Agricultural Engineers. Vol.23.** Pp. 249-252.

The objective of this paper is to throw light on an efficient and effective method of achieving grain preservation through drying.

The method adopted is simply buoying the grain to be dried in a stream of hot air. i.e. the grains are fluidised in hot air.

A good way used here is that air stream is generated from a blower. The air stream is now blown through a heat exchanger, which heats up the air before passing through the bed containing grains at an effective depth, which enables transport in and out of the bed to ensure effective distribution of hot air paper determined optimal sizing for equipment parts for effective drying of specified quantities of grain. This type assumed presence of infrastructural facilities, of road, electricity and adequate provision for storage, and is good for industrial application for a wide variety of agricultural products, especially grains and powdered food items.

- NPA 840 Nkama, Iro. (1991). *Aspergillus flavus* Infestation And Aflatoxin Contamination Of Some Nigerian Rice Varieties. **Nigerian Food Journal. Vol.9.** Pp. 78-85.

In this study for paddy rice samples were used. Three of the samples originated from Nigeria and one from the USA. These paddy samples were inoculated with toxigenic strain of *Aspergillus flavus* Link ex Fr culture (IMI 261824). Examination of samples before deliberate inoculation revealed that the degree of infection with moulds ranged from 51-58% and small quantities of aflatoxin B₁ (15-20ug/kg of rice were detected. After inoculation and storage at 30°C at elevated moisture content for 14 days, the degree of infection and accumulation of aflatoxin B₁ and B₂ in rice samples were rapid. About 88-100% of these samples were further infected with *A. flavus*. Rice samples with intact husk showed lower levels of infection and aflatoxin accumulation. In all samples, more aflatoxin B₁ and B₂ was produced and the average ratio was 11.9:1. The concentration of aflatoxin in rice samples with intact husk reached 2070

- NPA 841 Nnam, N.M. (2000). Evaluation Of The Effect Of Sprouting On The Viscosity, Proximate Composition And Mineral Content Of Hungry Rice, Acha (*Digitaria Exilis*) Flours. **Nigerian Food Journal. Vol.18.** Pp. 57-62.

The study examined the effect of sprouting on the nutritional worth of acha seed. The seeds were sprouted for 0, 24, 36, 48 and 60th. The 0h flour served as the control. Standard assay procedures were used to evaluate the flours for nutrient composition. Gruels were prepared from

both the unspouted and sprouted flours. The viscosity of the gruels was tested. Sprouting increased the protein, ash, crude fibre, ascorbate and mineral was more beneficial in improving phosphorus, calcium and iron levels. Sprouting significantly reduced the viscosity of the gruels from 1324.84cp in the control to 126.85cp in the 24,36, and 48 h sprouted sample and 84.55cp in the sample sprouted for 60 h. Sprouting appeared to be a promising food processing method for improving the nutrient and energy densities of acha gruel particularly for weaning infants

- NPA 842 Nagugu, N. I. and Akubuo, C. O. [2010] Development and Testing Of A Bambara Groundnut Pod Shelling Machine
Book Of Proceedings Of The 10th International Conference and 31st Annual General Meeting

A motorized bambara groundnut pod sheller was designed, constructed and evaluated. The performance of the sheller was evaluated, and the following mean results were obtained; Throughput capacity of 26.09kg, shelling efficiency of 66.3%, material efficiency of 75.89% at a speed of 1294m/s. The pods were shelled at three different moisture level; 10.68%, 13.71% and 15.68% to ascertain optimum moisture content for shelling. Results revealed that the highest shelling efficiency of 70% was obtained at the pod moisture content of 15.26% wb. It was also found from the analysis that there was minimum percentage mechanical damage at 22.98% moisture content wb.

- NPA 843 Nwankwo, F.I. and Nwogu, E.O. (1976). A Survey Of The Quality Of Yellow And White Maize Sold In Port-Harcourt Market.
NSPRI Technical Report. No.9. Pp. 83-85.

A market survey was made to compare white and yellow maize varieties. Oil content, free fatty acid content, moisture content and insect damage were compared. The oil contents of the maize varieties were fairly constant about 4%. Almost invariably the yellow maize was found to be more heavily infested and this probably caused the higher free fatty acid levels recorded for this variety of maize.

- NPA 844 Nwokedi, G.I.C. and Jegede, M.O. (1972). A Study Of The Shelf-Life Of Stout Beer Brewed In Nigeria.
NSPRI Technical Report. No.15. Pp. 97-98.

Stout Beer from Ikeja, Lagos, Nigeria has a very good shelf-life retaining its properties and quality well beyond six months after brewing and

bottling. The ambient temperature recorded in the Laboratory was in the range 29°C-32°C.

- PA845 Adeogun E .O and Ahaneku [2002] Lysimetric Evaluation Of Seasonal Crop Coeficients For Cowpea.
Journal of Agricultural Engineering And Technology.Vol.10. pp65-69.

Lysimetric studies were conducted for two years establish the crop coefficients for cowpea [vigna sinensis]. A hydraulic Weighing lysimeter was utilized for the determination of the crop evapotranspiration [ET crop] At the various stages of crop growth, while the reference crop evapotranspiration [ET] was computed from meteorological data obtained from weather station at the experimental site. The crop coe ficients obtained for the study period ranged from 0.2 to 0.9. The implications of these findings to irrigation farming are discussed.

- NPA 846 Nwokolo, E. (1987). A Nutritional Assessment Of African Yam Beans *Sphenostylis stenocarpa* (Hochst Ex.A.Rich) And Harms Bambara Groundnuts *Voandzeia subterranea L.*
Journal Of Science Of Food And Agriculture.Vol. 41 No 2 Pp.123-131.

Two grain legumes *Sphenostylis stenocarpa* (Hochst ex A. Rich) Harms. And *Voandzeia subterranean L.* commonly grown in the tropics for human consumption, were evaluated nutritionally using broiler chick assays. Metabolisable energy content was high in both pulses, but true protein digestibility was low in *S. stenocarpa* (62.9%) and moderate in *V. subterranean* (77.0%). Both mineral content and availability were moderate. Amino acid content was similar to that of other pulses, cystine and methionine being low. Amino acid availability differed significantly between *S. Stenocarpa* (62.6%) and *V. substerranea* (83.0%). Fatty acid composition was similar to that observed in most commonly eaten pulses.

- NPA 847 Obatolu, V.A., Osho, S.M. and Uwaegbute. (1995). Comparative Physicochemical Properties Of fermented Soybean And Locust Bean.
Post Harvest Technology And Commodity Marketing. Pp. 163-168.

Daddawa is a flavor enhancing product made from fermented locust bean that is widely used as a soup condiment in Nigeria. Due to high demand for this product, daddawa is becoming expensive and latervative cheaper products which are more readily available are required. This study

compared the quality of fermented locust bean with a similar product made from fermented soybean, when fresh and when oven dried. The proximate and functional properties such as water absorption capacity (WAC) for absorption capacity, emulsifying capacity (EC), and foam capacity (FC) were determined. Results showed the formulations had an equal fermentation period but that locust beans took longer to cook before fermentation. The pH values of fresh daddawa were higher than for dried samples. Soybean daddawa deteriorated faster than fermented locust bean and processing was also found to affect product functionality. Overall, the products were considered acceptable to panelists but the fresh daddawa made from locust bean was preferred

- NPA 848 Obiegbuna, J.E. and Oghudu, E.A.D. (1998). The Effect Of Germination On Some Functional Properties Of Toasted Soy-Bean (Glycerine max) Flour.
Proceeding Of 22nd Annual NIFST Conference.Vol.11. Pp. 52-53.

Water and oil absorption capacities increased from 1.80 g/g and 1.22 g/g to 2.28 g/g and 1.38 g/g respectively in 24h, then decreased to 1.86 g/g and 1.00 g/g in 96h, Emulsion activity steadily decreased from 1.87- 0.36% during germination while emulsion stability first decreased to zero from 16.67% after 24 and 48h and then increased to 6.67% in 96h. Foaming capacity decreased from 7.69% to 5.77% in 24h before it increased to 9.62% in 96h. Foaming stability steadily increased from 120% to 280% in 96h. Swelling capacity decreased from 4.55 g/g to 1.75g/g in 96h. At 20% dispersion, the flour could not gel. The pH virtually remained constant throughout the germination period.

- NPA 849 Obiegbuna, J.E. and Onyia, O.U.A. (1999). Performance Of Maize-Wheat Bread.
Proceedings Of 23rd Annual NIFST Conference. Pp. 65-66.

Flavour, texture and general acceptability of maize bread were significantly [$p > 0.05$] affected by the level of gel incorporated to the dough. Except for appearance, maize bread with 10% gel scored highest and comparably to wheat bread. Gel incorporated bread produced from maize-wheat flour blends [20, 30, 40, 50, 60, 70] scored higher in all attributes than the wheat bread [the control] and thus are superior. Although lower than the control, specific volume of loaves were improved whereas incidence of mould were reduced by incorporation of gel to the flour blends.

NPA 850

Obiakor, S.I. (2000). Performance Evaluation Of A Manually Operated Multi Grain Cleaner-Cum-Grader.

Proceedings Of The First International Conference And Millennium General Meeting Of The Nigerian Institution Of Agricultural Engineers (A Division Of The Nigerian Society Of Engineers. Vol.22. Pp. 82-86.

A manually operated low cost cleaner-cum-grader was designed and fabricated at the National Centre for Agricultural mechanization (NCAM), Ilorin. The machine, designed mainly for the local small-medium scale processors, cleans as well as grades the cleaned products. The design of the machine was based on the principles of aerodynamic separation and differences in the size and shape of the products to be cleaned and graded. Cleaning is achieved by a six-blade centrifugal fan while the grading is carried out by an assembly of inter changeable reciprocating screens.

Priliminary performance test on the machine using shelled and uncleaned groundnut and melon crops at varying moisire contents yielded the following results ; At feed rates ranging from 0.16 kg / s -0. 20kg / s for groundnuts and 0.025 kg / s -0.35 kg /s for melon seeds the cleaning efficiency of the machine was found to vary from 84.0% to 94.10% for shelled groundnut at moisire cntents of 9.90%-13.95% [wb] and 68,50% to 88.72% for melon seeds at 12.50% -15.63%[wb] moisire contents respectively. The clean Grain Recovery efficiency range from 71.39% - 86. 0% for the shelled groundnut and 70.2% -82.0% for the shelled melon seeds

The above efficiency values gave a cleaning performance index of 60% - 70.30% for groundnut and 45.12% - 72.75% for melon seeds, respectively. The values of the grading efficiencies were found to range from 50% - 65% for groundnuts and 46. 10% - 58.30% for melon seeds.

NPA 851

Odunfa, V.S. Ayo (1979). The Rhizosphere Mycoflora Of Sorghum (Sorghum Bicolor.L.Moench).

Nigerian Journal Of Science Vol.13. No.1&2. Pp. 363-370.

The rthizosphere effect of sorghum root, expressed as R/S ratio, was highest (7:1) at 15 days after seed planting. Ssubsequently, the ratio decreased rapidly to 2:1 by 50 days. There was a slight increase in the chizosphere effect after this period up to 100 days. More species of ungi were isolated in the rhizosphere than the rhizoplane. The predominant fungal species isolated were *Trichoderma auroviride*, *Penicillium citrinum*, *Aspergillus niger* and various species of *Fusarium*. The fusaria were more frequely isolated form rhizoplane than from the rhizosphere. The common species were *F. oxysporum*, *F. solani*, and *F. semitectum*. The most important population change was in the rhizoplane; the initial population of *Penicillium* spp., *Phoma insidiosa* and the *Mucoraceae*

declined. These were succeeded by species of *Fusarium*, *Chaetomium*, *Phoma*, *Macrophomina phaseolina* and many dark sterile mycelia.

- NPA 852 Ofuyah, T.I. and Adenekan, O.M. (1997). Observation On Oviposition Decisions By Females Of A Nigerian Population Of *Callosobruchus maculatus* (F) (Coleoptera:Bruchidae). **Nigerian Journal Of Entomology. Vol.14 and 15.** Pp. 51-61.

The oviposition behaviour of a Nigerian population of *Callosobruchus maculatus* (F.) when presented with seeds bearing different egg-loads, was observed under ambient laboratory conditions in Akure, Nigeria. Data obtained were analysed to distinguish two strategies by which females prefer pristine seeds or seeds bearing relatively few eggs for oviposition. The first is a relative rule in which a female compares the seed she is currently inspecting with a memory trace for the seed (s) visited previously. The second is an absolute rule in which the female responds only to the current egg load on a seed, but where each increase in egg-load corresponds to a lower probability of acceptance. It was concluded that *C. maculatus* utilises both rules in egg laying decisions depending on the disparity in egg density of the seeds. When the largest difference between the number of eggs on any two seeds was low (4 or less), the relative rule prevailed; but when the difference was high (up to 6 or 8), the absolute rule applied. Data were also provided which indicate that obscured eggs (borne in part of seed in close contact with floor of Petri plate) were not processed during egg-load assessment by *C. maculatus* females.

- NPA 853 Ofuyah, T.I. and Adetuntan, S.A. (1999). Effect Of Cowpea Seed Resistance And Larval Competition On The Development And Survival Of *Callosobruchus maculatus* (F) (Coleoptera:Bruchidae). **Nigerian Journal Of Entomology. Vol.16.** Pp. 14-22.

The cowpea seed beetle, *Callosobruchus maculatus* (F.) damages stored seeds of cowpea, *Vigna unguiculata* (L.) Walp., an important protein source in human diet in Sub-Saharan West Africa. A major approach to the control of beetle is use of seed resistance. The effects of seed resistance in cowpea and larval competition on the development and survival of *C. maculatus* had not been adequately elucidated. In this study, a known susceptible (Ife Brown) and three resistant varieties of cowpea (IT84S-2246-4, IT85F-2205 and IT90K-391) were subjected to three different levels of larval infestation (one, five and ten larvae per seed) at 30 + 10°C and 50 + 10% relative humidity. A beetle colony derived from infested cowpea seeds in a local market Akure, Nigeria, was

employed. Beetle development and larval survival to adult emergence in the cowpeas, were measured. The results confirmed that IT90K-391, Itu5F-2205 and (T84S-2246-4 were less susceptible to *C. maculatus* than Ife Brown. It was observed that in the susceptible and resistant cowpeas, development time was not affected by level of larval infestation. Percentage adult emergency decreased significantly ($P < 0.05$) with increase in level of larval infestation in the resistant cowpeas. The significance of these observations is discussed

NPA 854

Ofuyah, I. Thomas (1999). Aspect Of The Biology Of The Seed Beetle *Bruchidius Atrolineatus* (Pic.) (Coleoptera:Bruchidae) On Stored Seeds Of Cowpea, *Vigna unguiculata* (L) Walp.
Nigerian Journal Of Entomology. Vol.16. Pp. 23-31.

Observations were made on the biology of the seed beetle. *Bruchidius atrolineatus* (Pic.) which attacks seeds of cowpea, *Vigna unguiculata* (L.) Walp. In the West African Sahel. The egg laying pattern and realized fecundity of females, effect of host availability on egg laying, effect of seed size on seed choice for oviposition and beetle population fluctuation, were examined. The number of eggs laid by females reached a peak in the first day after emergency and decreased with age. The realized fecundity of females was 56.73 ± 1.37 eggs. Female fecundity and fertility were not influenced by duplicate mating. Female fecundity and development period were independent of seed population and size. *B. atrolineatus* preferred large seeds to smaller ones for oviposition. Larvae consumed more seed material (18.8 ± 0.72 mg) from larger seeds and thus produced bigger adults (5.1 ± 0.62 mg). There were more survivors from larger seeds at infestation level of four or more larvae per seed. These observations are discussed in relation to the population dynamics of the species.