# THE ROLE OF THE NIGERIAN STORED PRODUCTS RESEARCH INSTITUTE IN STORAGE AND PROTECTION OF TROPICAL PRODUCTS

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**INTRODUCTION:** Research into storage of agricultural products in Nigeria started in 1948 when a survey team was sent to Nigeria financed from Colonial Development and Welfare funds. The terms of reference were: (a) To survey stored food produce in the West African Colonies. (b) Losses and deterioration due to insects and other causes were to be studied and recommendations made for reducing them. (c) The bionomics of the main infesting pests were to be worked out. The West African Pest Infestation Survey Team (W.A.P.I.S.) Reported in 1950 and recommended a continuation and extension of research into the conservation of food supplies and methods of quality improvement. This was arranged and the name of the organisation was slightly changed to West African Pest Infestation Research Unit (W.A.P.I.R.U.). In 1954, the Unit was made permanent and funded entirely from Nigeria. The name was modified to West African Stored Products Research Unit (W.A.S.P.R.U.) thereby widening the scope of research to stored products general rather than infestation only.

For a long time, the work was oriented towards export crops with little work on locally used foods. The name Nigerian Stored Products Research Institute was adopted in 1963.

The Institute's work is expected to cover the whole of Nigeria. In doing this the Institute established branches in the main climatic zones of Nigeria which cover the very humid tropical areas of Southern Nigeria to the dry Northern Sahelian Zones. Purpose designed laboratories in Ibadan and Kano were occupied in 1957 while the Port Harcourt laboratory was opened in 1958. The Headquarters is at Lagos and a relatively new branch is located at Sapele.

Lagos, Port Harcourt and Sapele cater for the Port storage and very high humid zones of the country, Ibadan for the high humid zones and Kano for the low humid areas.

**TERMS OF REFERENCE:** The Decree establishing the Institute stipulates that it shall carry out Research into bulk storage problems of export commodities and local food crops, and in particular it shall conduct research into: (a) improvement and maintenance of the quality of bulk of export commodity crops including cocoa, groundnuts, palm produce i.e. (kernel and oil). (b) improvement and maintenance of the quality of local food crops including

cereals, pulses, tubers and any other local commodity under bulk storage. (c) Special studies such as stored product pests, pesticide formulations and residues, and mycotoxin surveys. (d) provision of advice and training of extension workers in problems associated with stored products and materials used in storage and pest control including storage structure, new insecticides, new items of equipment and new techniques; and (e) any other related matters as may be determined from time to time by the National Science and Technology Development Agency.

**MODUS OPERANDI OF THE INSTITUTE:** As stated earlier, the Institute has branches covering all the climatic zones in Nigeria because storage problems are more related to climatic zones than any other parameter.

Investigations are carried out on all the crops enumerated above to find the causes of deterioration during harvesting, handling and storage with a view to evolving economically sound methods for reducing or eliminating the substantial losses to which harvested crops are prone under tropical conditions. The different disciplines involved are entomology, microbiology, and chemistry, zoology (rodents mainly), storage physiology and storage engineering. An interdisciplinary approach is employed in investigating the storage problems. Also, priority is given to most pressing or urgent problems.

From the beginning of the work on stored products, much emphasis was laid on practical demonstration. From 1956, an Annual Report was issued giving brief accounts of the research work and other activities of the Institute but in 1960 the Annual Report was expanded to include more detailed reports of research. This system continued with reprints of technical reports being made available for distribution. In all 265 technical reports have been printed together with 46 in other Journals.

Research into Stored Product Entomology has followed the following procedure over the years: (a) Work starts with the survey of insect pests of the commodities. They are identified and classified into order of importance in relation to such commodities.

(b) The biology and ecology of the important pests on each commodity are studied. This gives an idea of when they can be present and at what time to apply control or preventive measures in storage.

(c) Studies are carried out on insecticides that can be used to control the insect infestation. This starts with laboratory trials and if found promising, followed by large scale trials in the field or stores or in silos.

(d) When the facilities are available or in liaison with other research organisations insecticide residues from the large scale trials are analysed. This is to follow the rate of breakdown to permissible residue levels.

(e) The effect of the insecticides or conditions of storage on the food constituents, and other parameters such as viability and organoleptic acceptance etc. is studied.

(f) After all these studies have been satisfactorily carried out, recommendations on insect pest control measures are made.

The highlights of our research results can be found in our Annual reports referred to earlier.

**TRANSFER OF INSTITUTE TECHNOLOGY TO USERS:** The past and present systems in use on storage and pest control on groundnuts and cocoa are based on N.S.P.R.I.'s advice exclusively, supported by ongoing training of Produce Inspection and Pest Control personnel given by N.S.P.R.I. at the request of state Authorities concerned. The training includes practical demonstrations and courses in storage technology primarily for workers involved in pest control in both private and public sectors. No treatment is allowed other than those recommended by N.S.P.R.I. All the the Federal and state pest control teams were set up by N.S.P.R.I. Grain Storage at state level is carried out in warehouses and the Produce Inspection Divisions are charged with the quality control responsibilities. All storage and pest control recommendations are made by the Institute. Assistance with storage problems is also given to the National Grain Production Company. Farmers and Village Communities in the five South-Western States are storing maize, using a method recommended by N.S.P.R.I.

**SPECIFIC RESEARCH RESULTS THAT HAVE BEEN APPLIED ARRANGED ACCORDING TO COMMODITY AND IN CHRONOLOGICAL ORDER:**

1. Groundnuts:

| Year | Production |
|---|---|
| 1956 | The use of Sizalkraft paper for dunnage to replace husks was extended and it was shown that its universal use on the plinth of groundnut pyramids saved 50,000 per annum in the form of improved quality compared with use of husks. |
| 1957 | Malathion was introduced as spray for groundnut pyramids and proved more effective than Lindane. |
| 1961 | Malathion was dropped for use on groundnut pyramids because of resistance by *Tribolium castaneum*, the major pest. |
| 1963 | The shape of groundnut pyramid was changed to facilitate fumigation with Methyl Bromide. Better distribution of gas was found and the new shape became standard. |
| 1964 | The use of standard fumigation covers to fit the standard pyramids adopted was introduced after being found satisfactory. |

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| 1964 | Polythene sheets were successfully used as dunnage for groundnut pyramids and put into practice with effect from 1964/65 season. |
| 1966 | The use of warfarin rodenticides at the groundnut pyramid sites was recommended after investigation. |
| 1968 | Phosphine was introduced for fumigation of groundnuts at Port after research investigation. |
| 1968 | Expertise gathered by work on Aflatoxin contamination of groundnuts started to be put to use in support of international negotiation. |
| 1970 | Iodofenphos was tested and found suitable for use on warehouse walls to control *Trogoderma granarium* on groundnut cake at port. Recommendations are adopted up to the present. |

2. Cocoa:

| Year | Production |
|---|---|
| 1957 | Termination of misting of cocoa warehouses with pyrethrins caused by no useful effect being discovered. |
| 1957 | D.D.T. was adopted for spraying walls of cocoa stores during moratorium period between seasons. |
| 1958 | Use of methyl bromide as a standard procedure was adopted after studies and advice. |
| 1963 | Revised standard system for fumigation of large stacks of cocoa was adopted after testing by N.S.P.R.I. |
| 1967 | Standard fumigation technique for use of methyl bromide at new cocoa warehouse at Ikeja worked out by N.S.P.R.I. and was adopted by the State Produce Inspection Division. |
| 1970 | Recommendation for use of DDT on walls of cocoa warehouses in the moratorium period was abandoned and tetrachlorvinphos substituted after tests by N.S.P.R.I. |

3. Grain Storage:

| Year | Production |
|---|---|
| 1969 | Investigations on use of plastic envelopes to enable fumigation of grain stored in warehouses and the embedding of the sheet in insecticide dust were successful, and began to be put into practice. Fumigation is with Phosphine or Methyl Bromide. |
| 1969 | Work on crib storage of maize and pest control resumed and used in supporting extension work in local villages. This has been going on with more and more villages using correct techniques for applying Lindane to cribs for protection against insect pests |

and correct crib design to prevent rodent attack and aid drying. Safer and more effective organophosphorus insecticides are now being introduced. The work has spread to five states already. Demonstration cribs are now being constructed in various parts of the Federation and the Institute's involvement in extension work is to be expanded.

Better storage of grains and pulses in Nigeria is coming about as a result of publications based on research results disseminated by Annual Reports, brochures, radio, television broadcasts in both English and Vernacular, visits to storage sites and practical demonstrations to farmers and extension workers of State Ministries of Agriculture, traders and industrialists. It is now possible to store grains and pulses for longer than a year. Many food packaging industries have been established with the help of N.S.P.R.I.

However, a number of research results have not led to practical recommendations but have provided background information in which to gain wider experience so that N.S.P.R.I. experts can discuss cocoa storage, groundnut storage, village-level grain storage, pest control, yam storage etc. at conferences and meetings in Nigeria and overseas.

This expertise so improved leads to more meaningful practical recommendations when the need arises.

**FEEDBACK:** The institute has several sources of feedback to evaluate its recommendations and formulate new programmes of work. Some of the sources are as follows: (a) Overseas complaints on export crops to Federal Ministry of Trade are referred to the Institute for investigation. Similar complaints have been investigated for the Ministry of Health. (b) Problems of international trade are referred to the Institute through our representation on Scientific and Technical Committees of the African Groundnut Council and the Cocoa Producers Alliance. (c) Problems are brought to our attention by the United Kingdom Produce Inspection Service and the Tropical Products Institute in London. (d) We are approached directly by State Produce Inspection Services, Ministries of Agriculture, the Ministry of Trade, the National Grain Production Company and the Commodity Boards when storage problems arise. (e) Organisations involved in storage and pest control work and interested University departments and Institutes are invited to our work programme review committee meetings when new problems can be discussed. (f) Surveys of existing storage sites, facilities and techniques and visits to farmers are made from time to time by N.S.P.R.I. officers when problems are discussed and

and advice given or new research proposals suggested. (g) N.S.P.R.I. participated in the preparation of the F.A.O. Action prgoramme for reducing post-harvest food losses, so as to implement the resolution of the seventh special session of the United Nations General Assembly of September 1975 which set a target of a 50% reduction of these losses by 1985. (h) We are approached by various companies or their prospective customers to test their products.

Despite several limitations of N.S.P.R.I. I have tried in this paper to give in broad outline the role N.S.P.R.I. has been playing for the past thirty years to improve the storage and protection of tropical crops. We have always realized that storage is a key factor in agricultural production and processing. An effective storage technique has helped in stimulating voluntary increase in agricultural production because the farmer is sure that his surplus crop will not go to waste. So also, effective storage has stimulated establishment of viable agricultural processing industries because the investor has seen that he can have steady supply of high quality raw materials throughout the year thereby keeping his labour force and machinery busy throughout. The consumer is happy too with the good quality food he buys throughout the seasons, and with the reduction in fluctuation of prices. With all these desirable effects of good storage techniques, N.S.P.R.I. is aware of the arduous task before it and if supplied with all the necessary resources we would continue to fight the pests that are attacking our stored products. Thank you.