

Journal of Chemical, Biological and Physical Sciences



An International Peer Review E-3 Journal of Sciences

Available online at www.jcbpsc.org

Section B: Biological Science

CODEN (USA): JCBPAT

Research article

Indigenous Methods of Conservation of Seeds and Other Propagules for Use in Subsequent Planting Seasons in Otukpa District of Benue State, Nigeria

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Received: 6 July 2013; **Revised:** 26 July 2013; **Accepted:** 30 July 2013

Abstract: The methods of conservation being employed by the rural farmers in Otukpa District of Benue State in Nigeria were the focus of this study. Eleven rural communities were randomly selected and 8 rural farmers were interviewed in each community. Questionnaires were deployed to elicit the methods of conservation generally practiced and other associated activities including the underlying factors propelling the conservation mission. Generally, the farmers subjected their seeds to drying in sunlight and different traditional pre-treatment before storage while the roots and tubers were buried in the soil using appropriate method. It was observed at the end of the study that the rural farmers were truly custodians of the natural resources in their domain and not poachers and that basically their indigenous knowledge and traditional methods of conservation were handed down to them from succeeding generations. By and large, the rural farmers have proved to be of inestimable asset to the sustainable use of plant genetic resources in our fast depleting ecosystem. It is therefore necessary to build a synergy between the rural farmers and scientists so that indigenous knowledge and modern sciences are integrated to showcase innovation and pragmatic agricultural practices.

Key words: conservation, seeds, rural farmers, indigenous knowledge, plant genetic resources.

INTRODUCTION

It is an acknowledged fact that much of the world's biological diversity is in the custody of farmers who follow age-old farming and land use practices. These ecologically complex agricultural systems associated with centres of crop genetic diversity include not only the traditional cultivars or 'landraces' that constitute an essential part of our world crop genetic heritage, but also wild plant and animal species that serve humanity as biological resources. It has been found that farmers evaluate cultivars using a wide variety of criteria that can be of immense interest and value to crop breeders. In Zambia, the farmers' evaluation of a high-yielding hybrid maize variety and description of the positive and negative characteristics of locally adapted open-pollinated varieties led to a more effective national maize breeding program. Taking the time and effort to record the indigenous agricultural knowledge for a given ethnic group can provide important guidance for the research agenda for both national and international agricultural research centres¹.

Indigenous knowledge provides the basis for grassroots decision-making, much of which takes place at the community level through indigenous organizations and associations where problems are identified and solutions to them are determined. Solution-seeking behavior is based on indigenous creativity leading to experimentation and innovations as well as the appraisal of knowledge and technologies introduced from other societies¹. An important element of conservation across regional enclaves is the understanding and detailed knowledge of the components of biodiversity possessed by the natives especially the rural farmers of their locale and the dynamics of the ecosystem. Through observations, assessments and experimentations, these natives would have successfully adopted their production methods towards the characteristics of these biological resources^{2, 8}. The knowledge of farmers in their local settings concerning plant conservation, if properly documented, can assist scientists in the field of plant conservation. It has been observed that farmers are true conservers of diversity and not just users. Also, the contribution of farmers to plant genetic resources conservation would be better appreciated if scientists and farmers collaborate to have a blend of the traditional and modern sciences³.

Plant conservation is a deliberate attempt to conserve plants so that generation upon generation will have access to the plants and use them. Rural farmers have been able to conserve plants for a long period using their own indigenous methods. This traditional/indigenous knowledge is unrecorded, but it is passed down from generation to generation by word of mouth. Traditional knowledge is the totality of all knowledge and processes, whether explicit or implicit, used in managing socio-economic and ecological facets of life⁴. It is, therefore, an undeniable fact that one cannot talk about plant genetic resources conservation without considering the activities of farmers. Farmers have managed plant genetic resources for as long as they have cultivated crops. Most farmers continually improve the genetic characteristics of their crops by selecting seed for the next season from the best of plants. Also, over the years, African farmers have come up with several solutions to the problem of how to safely store their harvest for use as food and to ensure that adequate seed is available for the next planting season. The *Ganawuri* people in Nigeria use the *rumbu* to conserve cereal, while the *Moru* people of southern Sudan use the *kiro* ³.

The rural farmers have been observed to maintain the landraces of food crops under subsistence agriculture; thus, enhancing the chances of natural out-crossing *in situ* among subspecies and cultivars. Women have contributed greatly to preserving seed and other propagules. The practices of dusting seeds with wood ash and hanging fruits and cobs over fireplace were meant to prolong the storability and maintain viability of plants such as cowpea (*Vigna unguiculata*), maize (*Zea mays*), pepper (*Capsicum* spp.), eggplant (*Solanum gilo*), and lima beans (*Phaseolus lunatus*) from one

harvest season to the next planting season. Root and tuber crops were also stored in the ground to prolong their storage^{3, 5}. One other means by which farmers contribute to conserving plants is through Home Gardens. It is defined as a multispecies and multi-purpose garden sited close to the homestead, occurring to one side of it or partially surrounding it. Home Gardens are also *in situ* conservation sites for indigenous varieties of some crops while they do play a role in *in situ* protection and conservation of plant species that are threatened or endangered, as well as serve an important role in food security^{6, 9}. Ostensibly though, there have been several attempts to document the use of plants in several indigenous communities in Nigeria, there is a dearth of empirical information describing the linkages and relationships of traditional knowledge, use patterns and plant conservation issues with regard to the availability of the species used⁷. In this study therefore, we went forth to investigate the plant genetic resources conservation practices of rural farmers and also attempt to look at how their efforts could be aligned with the national conservation agenda.

MATERIALS AND METHODS

The study was targeted at rural farmers in Otukpa District within Ogbadibo L.G.A of Benue State, in the North Central geo-political zone of Nigeria. The predominant inhabitants of this area were the Idoma speaking tribe and a cross section of them were petty traders, farmers, palm-wine tappers, primary school teachers, herbalists and even artisans. The sample frame consisted of male and female farmers between the ages of 25 and 60 while eleven villages in the district were randomly selected from several rural communities. In each village, 8 farmers were randomly selected and interviewed. The selected communities were Umarichi, Abo, Adumu, Agbafu, Obu, Odo, Ipari, Ipole, Ublegi, Oginago, and Orido. In all, 88 individuals were interviewed using pre-tested questionnaires administered to the farmers as most of them could neither read nor write. The administration of questionnaires and informal interviews were carried out between May 2012 and April 2013 via repeated visits to the selected study locations.

In the data collection process, both purposive and accidental methods of sampling were adopted. This was such that in the selected villages, the respondents approached were farmers who were within the age bracket of the predetermined age categorization of the study. Individuals interviewed using the purposive method were those within the randomly selected house to house location (i.e., the second or fourth house depending on the size of the village) while the accidental method was used to capture the respondents that were accosted within the selected villages. Some material evidences of conservation were assessed in the homes and accessible farms of the respondents.

RESULTS AND DISCUSSION

Table I is the reflection of the distribution of the ages of respondents. The older age strata such as 43-48yrs at 23.9% and 55-60yrs at 27.3% were the more abundant in the sample population which was indicative of the availability of a considerable number of mature and experience farmers in the locality. It is noteworthy to state that almost all the farmers interviewed practiced conservation. Crops cultivated by the farmers included legumes (groundnut, *Arachis hypogae*;, bambara nut, *Vigna subterranean* and common beans, *Phaseolus spp*), cereals (maize, *Zea mays*; sorghum or guinea corn, *Sorghum bicolor*; pearl millet, *Pennisetum glaucum*), vegetables (pepper, *Capsicum spp.*; okra, *Abelmoscus esculenta*; tomato, *Lycopersicum esculentum* and melon, *Citrullus lanatus*), and roots and tubers (cocoyam, *Xanthosoma sagittifolium*; sweet potato, *Ipomoea batatas*; cassava, *Manihot esculenta* and yam, *Dioscorea spp.*). Most farmers cultivated two or more crops at the same time (mixed farming). The methods of conservation were not different from one community to another. The farmers conserved all the crops under cultivation and some of their peculiar methods of

conservation were not in doubt. In their bid to conserve Bambara nuts (*Vigna subterranea*) the farmers reported that they follow either of two processes, after the crops have matured and were allowed to dry adequately. Generally the pods were pounded to get the seeds; from this stage either of the two pathways of conservation can then be followed.

Table- I: Age strata of respondents indicating numerical and percentage cover

Age range	No. of people	Percentage (%)
25 – 30	4	4.6
31 – 36	9	10.2
37 –42	12	13.6
43 – 48	21	23.9
49 –54	18	20.5
55 –60	24	27.3

One step was that the seeds were lightly smeared with kerosene and stored away in safe container well corked or either that the seeds were stored in container together with dried whole (hot) pepper or seeds of pepper. Both methods essentially work out to prevent the seeds from pests attack. In the case of groundnuts, they were said to be dried whole usually for weeks depending on the intensity of sunlight after which the seeds were removed from their pods and kept away in sacks or bags devoid of high humidity and out of reach of pests. The method of conservation of melon is similar to that of groundnut except that the seeds which have protective seed coats were the materials sun-dried. The conservation of the common beans as recounted by the farmers was said to start usually with allowing the mature bean pods to dry properly by which time they could then be pounded to extract the seeds; such seeds were then mixed with ash and stored in suitable containers then corked as appropriate until the next planting season.

The method used in the conservation of maize was such that after harvesting from the field, the best ones were selected, tied together and hung above the cooking fire in the kitchen. As the women cook, the heat and smoke from the fire expel any pests in the grain and keep away new pests. The heat also reduces the moisture content thereby preventing microbial or fungal growth. For the conservation of sorghum called ‘igwu’ and millet called ‘eaye’ in the local parlance; they were often harvested with the kernels tied together in bunches which were sun dried on elevated beds out of reach of domestic livestock and fowls. The kernels were later threshed either by pounding or beating and the good seeds stored away in safe container until needed. In respect of conservation of vegetables such as pepper and tomatoes, the farmers usually collect the mature fruits pound them in a small mortar or soak them in water; the seeds were subsequently extracted, dried and wrapped in a paper or put in a bottle or other good container and kept in a secure place. But for okro, the fruits were allowed to dry well on the plant before harvesting, and the seeds extracted. The seeds were mostly stored in a bottle well corked. The method used for the conservation of yam mostly the *D. alata*, *D. dumetorum*, *D. cayenensis*, and *D. rotundata* by the farmers was majorly building of heaps of tubers on open ground in an aerated, dry and cool environment with minimal exposure to sunlight and light mulching on the heaps. This method was followed to prevent dampness of the heap and discourage microbial growth

but encourage transmittal of minimal rays of sunlight. Such heaps could be ploughed in for retrieval of some tubers for consumption should such a need arise. In other instance, the farmers dug around the yam to expose it which would then be decapitated, leaving the head and roots in the soil. The tuber was removed from the mound and the remaining head and roots were covered with soil. The head usually sprout again to yield small tubers which were used as “seeds” for planting. This method was used to conserve *D. cayenensis*, and *D. rotundata* but considered not suitable for *D. alata* called “ebina”. Relating the technique applied for the conservation of cassava, the farmers said the sticks were put in a dry, cool place under a tree and against the tree while ensuring that the sticks were few centimeters inside the soil with the buds pointing up.

The general method deployed for the conservation of sweet potato as explained by most of the respondents was that holes were dug under shade and the desired tubers for regeneration were then buried few centimeters deep, covered with soil. The potato tubers were all placed side by side in single layers, never on top of each other to forestall any such prevailing condition that would encourage rot of the tubers. Conservation of cocoyam was said to follow similar pattern to that of potato with the only difference being that the holes dug were usually covered with palm fronds or similar leaves and not with soil.

The traditional methods of conservation were handed down from one generation to the next. In addition, the overriding factor responsible for the conservation efforts and practices of farmers in this district has been attributed to the drive for continuity and sustainability to attain socio-economic vibrancy and independence. Experiences from the past have indicated few incidences of staggered pathogenic infestations on the conserved propagules but the farmers have managed to salvage such attacks (since they were usually not widespread) by their networking support effort. Some other threats to the conservation efforts of the farmers were improper storage, unfavorable weather condition and drought.

CONCLUSION

If the world were to properly conserve and use genetic resources for both present and future generations, the informal sector comprising of these rural farmers and the Aborigines who are custodians of their local resource should be encouraged to contribute to the revamp of the agricultural sector. Hence, the findings of this study strongly recommend a strong collaboration between scientists and farmers to improve the methods of conservation used by farmers to meet the demands of long-term conservation as most methods employed by the farmers were for short term duration

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