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CARIBBEAN FOOD CROPS SOCIETY

34th Annual Meeting 1998

Rural Agricultural Development Authority
Ministry of Agriculture, Jamaica

"Enhancing Regional Food Security and Exports by Integrating National Strategies"

JAMAICA VOL. XXXIV

FOOD VALORIZATION OF AGRICULTURAL RESOURCES

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ABSTRACT

In spite of the low volume of industrial activities from local agricultural resources, food industry is an important potential for the countries of the Caribbean basin. The current situation and future prospects are in relation with the recent history, featured by a multicultural encounter. Development could occur by the rational association of some potentialities. Food technology research is a powerful lever to collect information allowing to manage and to rationalize sustainable transformation processes and activities.

Successful work has been done with distilleries wastewaters treatment and valorization. The first commercial yeast strain, selected for rum production, is issued from our collection. We are experimenting lactic fermentation as dressing and/or preserving means for local production.We contribute to local bioresources best knowledge and valorization.

INTRODUCTION

The current Caribbean populations are the result of a non-conciliatory encounter of human groups, after the Medieaval era. Firstly, there was a shock between preexsisting American Indian culture and European and African cultural elements. Then were added Asian elements from India and China. The food, natural resources, the processed products and valorization perspectives are in relation with those successive contributions.

PATRIMONIAL CONSIDERATIONS

The food pattern of the aboriginal population, from warm areas in Central America and Amazonia, was based upon hunting, fishing, picking, and an itinerant agriculture where cassava (*Maniho utilissima*) was the basic food; other foodstuffs were : cush-cush (*Dioscorea trifida*), sweet potato (*Ipomea batata*), tannia (*Xanthosoma sagittifolium*), arrow-root (*Maranta arundinacea*), bay (*Pimenta racemosa*), peanut (*Arachis hypogea*). In Central America and in Mexico the prevailing agricultural crop production centred on corn (*Zea mays*), which lead to the great Maya and Aztec civilizations. It is noteworthy to underline that dairy produce were not used, except in Andean areas. About fruits, American tropical areas have largely contributed to the world foodstuff pattern with : pine-apple (*Ananas comosus*), avocado (*Persea americana*), papaya (*Carica papaya*), guava (*Psidium guajava*), the genus *Anona* of which soursop (*Anona muricata*), passion fruit (*Passiflora edulis*), black apple (*Diospyros digyna*) , cashew nut and cashew apple (*Anacardium occidentale*), cherry (*Malpighia pucniciflora*). The sweet taste was given by various types of honeys. There were also the beverages contribution with the fermented ones : the chicha from corn, the pulque from agave (*Agave atrovirens*) and others from sweet-potatoes ; we have also to mention the cocoa (*Theobroma cacao*), and the exciting and narcotic drinks made of coca (*Erythroxylum coca*).

Spices and condimentary plants which were used in food seasoning and/or body care by the American Indians are today well known : annatto (*Bixa orellana*), vanilla (*Vanilla fragrans*), chillis (*Capsicum annuum* and *frutescens*), allspice (*Pimenta dioica*), pink peppercorn (*Schimus terebinthifolius*).

In the XVIIth century, appeared the *encomienda* subjecting the American Indians, and the slavery plantation imported from the Mediterranean basin. Caribbean societies were featured by dependence on an overseas motherland. The sugarcane, originating from New-Guinea, was introduced in Middle East, during antiquity ;

then it was spread in the Mediterranean basin, and finally was imported to America by Christopher Colombus and Cabral. *Saccharum barberi*, the creole sugarcane, was introduced by Colombus and Cabral ; then *Saccharum officinarum*, Otaheite, was introduced around the end of XVIII th century, after Bougainville and Cook voyages. Sugarcane had and still has a prominent part in the relations, structuration and economy of Caribbean islands and countries.

Food plants introduction was done with the colonization; one of the most famous was the breadfruit (*Artocarpus altilis*). With the tropical plants, other plants from Mediterranean and temperate areas were acclimatized. Out of the three thousand plants recorded in the Antilles, one third has been introduced. So, some culinary touches (African and Indian) contribute to the local cooking.

Constraints from the plantation economy have played a determining part in the importation flow structuration (flour, grains, salt meat) which is perpetueted and is an explanation to some activities low development, such as fishing. Import substitution has become the food industry aim. Definition and obtainment of plant varieties appropriate to be processed is often the key for projects success.

AIMS OF RESEARCH

Our research activities, at the Station de Technologie des Produits Végétaux, INRA Antilles-Guyane, aim at elaborating knowledges on plants from the Caribbean. Some of them like pine-apple, banana are already well known, they are consumed fresh and processed. Others are much less known, outside and even in the Caribbean basin. Often those are, picking produces with a great biological and mechanical fragility. Their traditional processing frequently involved canesugar (jam, pastry) and rum (punch, cocktail); produces are preservation and/or dressing forms.

Microbial agents -yeasts and bacteria- are at the centre of our research activities. The objectives are to characterize these flora from the natural tropical media, to control their presence and activities. The expected result is to obtain edible products, regarding the consumer expectations on the various markets.

The generated knowledges on the raw materials and processes allow know-how valorization on tropical agricultural resources, particularly Caribbean ones.

Caribbean populations are young and consequently their traditional products are not numerous. Raw canesugar, rums, derived products from their association with tropical fruits are with culinaries dishes among the Caribbean's most original products.

Among the tens edible fruits and vegetables less known, originating from tropical America, there are approach works to undertake, in order to do emerge species with high agricultural, technological and commercial potential.

SOME RESEARCH OUTPUT

It is a necessity for the agro-industry units to be respectuous towards environment, particularly because of the insularity and the tourism activity. Therefore we have decided, since twenty years, to work in our research structure, on the self purifying capacity from the natural environment, with the perspective of its domestication in reactors. Interesting results have been yield, about vinasses treatment and valorization, some of them are valorized. We are carrying on our works on secondary treatments to improve the wastewaters purifying rate and discolouration.

The perspective for a better control of rum fermentation media lead us to select yeast strains. Since 1995 Lallemand S.A. sells the world first commercial yeast strain, selected for rum distilleries. This strain is issued from our collection. EDV 493 is its commercial name. We continue to work on microorganims -yeast and bacteria- for rum technology, generating aromatic products.

In our Unit, we also work for the lactic fermentation application like a process to dress and/or preserve agricultural products. It is not a traditional fermentation in the french Antilles. We tested it in a successfully manner on okra (*Hibiscus esculentus*). We obtained an highly appreciated aperitive form. We are fermenting various local resources for ready-to-use vegetables corresponding to an expressed demand of collective restoration.

PERSPECTIVES

The organization in chain of Caribbean agro industrial potentialities could offer possibilitics to economic animation. Some countries have an important potential of agricultural production with a high competitivness ; others have capacity to realized technological operations but with a limited agricultural capacity. Political choices seem to be done to help efficiently the wills going this sense at various levels.

Research in food technology could contribute to:

- raw-materials knowledge and determination of varieties adapted to transformations processes,
- study and rationalization of domestic and traditional transformations, expressing our respective identities, for valorization
- innovations.

Table1 : Main basic food production in the world, in million ton.

Resource	Year 1976	1986	1996	1997
WHEAT	419	528	586	608
CORN	351	478	590	586
RICE	347	469	569	570
POTATO	272	286	310	291
CASSAVA	113	134	163	164
BARLEY	166	177	156	156
SWEET POTATO	133	121	142	138
SORGHUM	61	70	70	63
SUGARCANE	687	932	1229	1251

Source FAO year book.