



# BAR DIGEST

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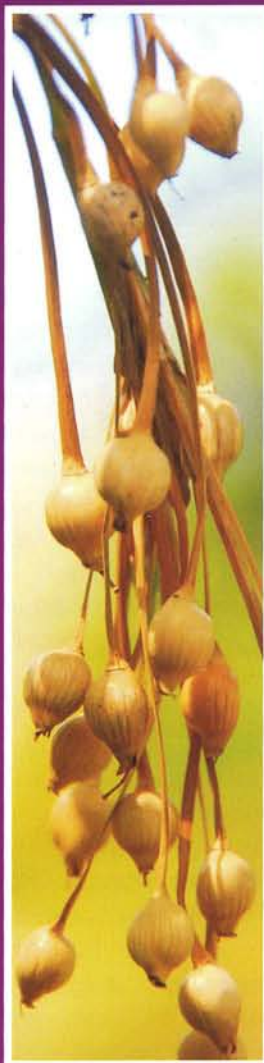
## Food Staple Crops



**RICE**



**WHITE  
CORN**



**ADLAI**



**CASSAVA**



**SWEET  
POTATO**





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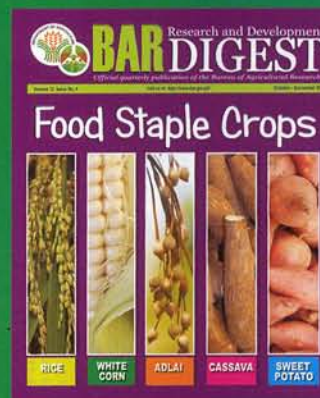
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BY DR. NICOMEDES P. ELEAZAR CESO IV

# Rice

## is NOT the ONLY staple food

**“DA is aware of the intricacies involved in food production, management, and conservation, hence several enabling measures have already been initiated to ensure food self-sufficiency and food security in 2013.”**

**S**ince time immemorial rice and its consumption has been, still and will be the country's staple food. Perhaps, one can surmise that a meal without cooked rice is not a complete meal. After all, we, Filipinos are rice lovers. The production of rice throughout the country is directed and geared toward addressing the food nutrition and requirement of an estimated 95 million Filipinos. By and large, rice is an important food crop and a good measurement for a country's economic soundness.

The production of rice, however, is still not sufficient to feed millions of Filipinos, which continues to grow. The lack of irrigation system needed to irrigate rice planted areas, the need for quality rice varieties (seeds) to ensure bountiful harvest, and infrastructure supports like farm-to-market-roads and postharvest facilities, among others, are only some of the direct interventions needed to address the rice production problems in the country.

The Department of Agriculture (DA) is aware of the intricacies involved in food production, management, and conservation. Several enabling measures have already been called for and initiated by DA with the end view of warranting food self-sufficiency and food security. One important measure is the institutionalization of the Agri-Pinoy

Framework for Agricultural Development. The framework captures the fundamental precepts of sustainable development. Moreover, these measures are designed to prepare the entire archipelago in the next millennium challenges.

*Agrikulturang Pilipino* or Agri-Pinoy as defined is the overall strategic framework that will guide various services and programs of DA from 2011-2016 and beyond. The Agri-Pinoy incorporates principles and practices that optimize the development of Philippine resources, natural and human, to achieve Philippine goals in agriculture and fisheries, and contribute to national development.

The program on food staples is part and parcel of the said framework and is the focus of this particular issue of the *BAR R&D Digest*. The Bureau of Agricultural Research (BAR), being the research and development (R&D) arm of the department, was specifically tasked to coordinate, fund, and support all initiatives geared towards achieving food self sufficiency by 2013.

One of the strategic approaches employed by DA to achieve food sufficiency is through the Food Staples Self-Sufficiency Program (FSSP) which is considered a pro-active stance of the department to combat poverty. The fundamental approach of the program is to meet the food needs of the



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Philippines, particularly promoting staple foods other than rice which are not only nutritious but accessible, affordable, and safe.

In the pursuit of food security, the Agri-Pinoy seeks to minimize our dependence on food imports, especially of staple food, by optimizing the development of the natural and human resources of the Philippines, toward increased productivity and increased incomes especially of primary producers. Agri-Pinoy promotes the principle of food self-sufficiency with full awareness of our global interdependence, and our various commitments to international trade agreements. Our trade policies and practices are integral to our efforts to achieve food security and self-sufficiency.

It is not the intention of the program to replace rice and corn as the country's food staples, but to supplement and complement them with other food sources. Given the above premises, it is imperative that we think of ways to boost our food production and help us achieve the ultimate goal by 2013.

This fourth quarter issue of BAR R&D Digest is dedicated to promoting and creating awareness, not only in the R&D community but the Filipinos in general, that there are other potential crops that we can tap to supplement our dietary needs aside from rice.

Aside from rice and corn, other food staple crops included in this issue are: cassava, sweet potato, and the seemingly-never-heard adlai that DA is intensively promoting. Aside from profiling these food staples, this issue also included recent R&D initiatives/endeavors, technologies, and interventions which were results from BAR-funded projects. ###





# In search of food:

## DA's Food Staples Self-Sufficiency Program

BY PATRICK RAYMUND A. LESACA

**T**he Agri-Pinoy Framework for Agricultural Development of the Department of Agriculture (DA) speaks of one thing—in search of food through an empowered agriculture and fisheries sector. This framework is designed to achieve one national common goal and that is to produce affordable and accessible food at any given time and at any given situation. And this is basic for human survival.

The Agri-Pinoy Framework on Local Development, Food Security, Natural Resource Management and Sustainable Development are only some of the concrete and specific measures laid down by the government to combat poverty and address specifically the looming concerns on food production. In

general, the country is basically an agricultural country and yet the clamor for food self-sufficiency is still the major agenda of the agriculture department.

Upon the assumption of Secretary Proceso J. Alcala at the helm of DA, his first marching order, among his many national priorities, was food. “Food for all” is the triggering mechanism for the entire department which led to the creation of a roadmap for the food staples program. The roadmap aimed to establish key production areas that will strengthen the food production program of DA. One will recall that the country used to be an agricultural exporter particularly of rice and corn during the 1970 period. This was the era where the Philippines once gained international reputation when it comes to food production. However, the strategy was not to regain the status of being a net

exporter, but to warrant and ensure food for everybody every day.

The Food Staples Self-Sufficiency Program (FSSP) is a result of series of workshops and dialogue among food stakeholders spearheaded by the DA-Rice Program and participated in by various agencies within the DA Family, namely: Regional Field Units (RFUs), Agricultural Training Institute (ATI), Bureau of Agricultural Research (BAR), Bureau of Plant Industry (BPI), Bureau of Soils and Water Management (BSWM), Philippine Center for Postharvest Development and Mechanization (PhilMech), Agricultural Credit Policy Council (ACPC), National Food Authority (NFA), National Irrigation Administration (NIA), Philippine Crop Insurance Corporation (PCIC) and the Philippine Rice Research Institute (PhilRice). These line agencies drafted the food





side, the Philippines experienced a declining level of self-sufficiency and increasing dependence on imports. From 91 percent in 1990, the level of self-sufficiency decreased to 80 percent in 2010. (DA-Rice Program).

Given these scenarios, roadmap included three major objectives: 1) produce at least 21.11 and 22.49 million tons of palay by end of 2013 and 2016, respectively; 2) maintain the per capita rice consumption at 120 kg/year; and 3) increase the production of non-rice staples by 3.5 percent annually.

The DA is set to achieve self-sufficiency by 2013 and shall maintain it through 2016. Thus, the target production committed by the different agencies and regional field units are higher than palay equivalent of the total rice requirement. To achieve these production targets, the government needs to increase palay area harvested as well as improve yield level.

The DA-Rice Program is optimistic that rice self-sufficiency will be attained by 2013. This battle, however, does not only rest upon a single unit of DA, but likewise, is a shared responsibility among the DA family—for the ability to serve food at any given time and place is an indication of a sound and stable economy. The government cannot do this gargantuan task alone, the support and cooperation of the consuming public in the fight for decent life is greatly needed.

Rice and corn are considered the country's staple foods. However, given the vast resources of the country, there are many potential staple crops that can be tapped. #####

staples road map that will propel the nation to food self-sufficiency. Each agency complemented the tasks at hand anchored on its specific mandate and program thrusts.

The state is committed to take immediate and appropriate actions toward its realization. According to the DA-Rice Program, food security is part of our Medium Term Philippine Development Plan (MTPDP) and is part of our commitments to the Millennium Development Goals (MDG) as set by the United Nations.

Staple foods are the food that we consume regularly in such quantities which constitute the dominant part of our food consumption. The country's palay production in 2008 recorded level high of 16.82 million tons. In fact, the Philippines ranked eight as the world's top palay producer. However, the 2010 production was reduced to 15.77 million tons because of the drought brought by the El Nino phenomenon in the first semester and typhoon *Juan* in the fourth quarter of 2011. If not for these calamities, palay production could be somewhere between 17-18 million tons in 2011.

The government is aware of such unpredictable weather patterns and unforeseen interventions, for instance, the increases in world food

prices and food scarcity in some parts of the globe have direct impact on our food production and consumption. And if these interventions are left unchecked, the country's food staples and food requirement might be compromised. Given this scenario, the government cannot afford to be complacent and must deliberately direct its attention towards utilizing every government resources and logistics needed to achieve food self-sufficiency and food security.

BAR, on its part, is committed to protect this cause and has been instrumental in the development of some food staples which have been in the R&D stages.

The increase in area harvested is one of the reasons for the increased palay production. In the last decade, palay area harvested grew more steadily at a rate of around 48,000 hectares per year despite the land conversion from rice to other crops and non-agriculture uses.

The continuous development of irrigation systems contributed immensely to the growth in palay area harvested. In the last decade, the growth in area harvested contributed 38 percent to the growth in palay production. Despite the relatively good performance in the production





# RICE: A Filipino constant

BY MARIA ANNA M. GUMAPAC

**Rice provides half of the calorie requirements, one-third of protein intake, and more than one-fifth of the calories consumed by humans on a worldwide scale.**

**R**ice or locally known as *palay*, *bigas*, *kanin* is common to the Filipinos, that is rarely ever missing on the table, be it breakfast, lunch, or dinner. A Filipino meal is not complete without it, even amidst huge gatherings and regardless of a resplendent menu. Even when it comes to *merienda* or snacks, rice is the Philippines' staple food.

Rice (*Oryza sativa*) is also the most important staple food for the majority of the world's human population. It is a seed of *O. sativa*, a cereal grain deemed with the third-highest worldwide production after corn and wheat. It is considered essential, particularly in Asia, the Middle East, and West Indies.

The average Filipino diet is based on this crop. Rice provides half of the calorie requirements, one-third of protein intake, and more than one-

fifth of the calories consumed by humans on a worldwide scale. It is rich in nutrients, with a number of vitamins and minerals, and is an impressive source of carbohydrates. Rice accounts for 20 percent of an average Filipino household's food expenditures.

## The number as it stands

Rice is grown in more than a hundred countries. Approximately 90 percent of the rice grown worldwide can be attributed to Asia which has more than 200 million rice farms, most of which are areas smaller than one hectare.

According to the Department of Agriculture (DA), rice is an economic commodity. "It is both a major expenditure item and a source of income for many households". The demand for this crop in the country crosses all social classes, with a percentage of rural households





depending upon the various stages of rice production as livelihood.

The problems noted lies in that according to the Pinoy Rice Knowledge Bank (PRKB), the Philippines' area that harvests rice is very small compared with major rice-producing countries in Asia. Although the country is agricultural in nature, it does not have the large land resource to produce the total rice requirement. India has 44 million hectares, China has 29.49 million hectares, Indonesia has 12.31 million hectares, Thailand has 10.25 million hectares, and Vietnam has 7.41 million hectares devoted to rice production alone. The Philippines has 4.46 million hectares only (according to the 2008 data).

Drawing even more comparison between the Philippines and other rice exporters in Asia for example, considering the large population, the Philippines feed 20 persons per hectare of area harvested to rice, while Thailand and Vietnam only feed 7 and 12 persons per hectare, respectively.

To summarize, the country's dilemma, according to the International Rice Research Institute (IRRI), is that there are three main factors why the Philippines remain dependent on other countries for rice supply: 1) land area, 2) population growth, and 3) infrastructure.

IRRI expounded that the infrastructure referring to irrigation, are underdeveloped, or not used nor maintained as efficiently as possible. They referred to issues on transport infrastructure, specifically good-quality roads that affect transport of rice and thus, hinder trade.

However, PRKB stated that palay production in the Philippines has tripled from 1970 with 5.32 million tons, to a peak in 2008 with 16.82 million tons. But with the string of typhoons back in 2009, this brought a slight decline to palay production, bringing the number down to 16.26 million tons. Nonetheless, it is still an impressive number in relation to its initial production.

On a more current note, the Bureau of Agricultural Statistics (BAS) posted that the production from October to December 2011 dropped to 5.94 million metric tons compared with 2010's 6.51 million metric tons (8.7 percent). Decrease on yield per hectare was also observed, with 3.56 metric tons in 2011 to 3.55 metric tons for this year. Again, the decrease in output was attributed to the harsh effects of typhoons in Central Luzon and Bicol.

Current numbers also showed that the total rice stock as of February 1, 2012 was 11.4 percent below that of January (2.33 million metric tons compared to 2.63 million metric tons, respectively). February 2012's production was also notably 23.6 percent lower than that of previous year's 3.05 million metric tons. In addition, compared to 2011's numbers, stocks in the households dropped by 13.9 percent, with the National Food Authority (NFA) depositories going down by 15.9 percent.

On a global scale, food supply is threatened by a growing demand to feed an increasing population in light of the scarcity in resources. Government support is critical to encourage domestic production, particularly self-sufficiency, to address issues of poverty, food insecurity, and providing long-term solutions to economic stability, as a large part of small Filipino farmers and rural household



depends on food farming. Growth in outputs and productivity is vital because a vast majority of the Filipinos rely on agriculture.

### Ongoing R&D efforts

Despite the challenges faced by the rice sector, as with any other staple food crops, efforts are pushed and maintained to ensure that rice remains a constant with the Filipinos. In lieu of this, DA is pushing for a rice self-sufficient country in 2013, as Agriculture Secretary Proceso J. Alcala assured.

These efforts are programs and incentives geared towards farmers that mean to encourage them to continue and persist in rice production. Programs include investing in irrigation projects—addressing already at least one of the three main problems identified earlier by IRRI—and assisting farmers in creating better livelihoods out of growing not only rice, but also other crops that could provide income for them while waiting for rice harvest.

In the aspect of population growth and the ever growing demand for rice, the DA is in the midst of looking into promoting other food staple crops, which is not only as nutritious as rice, but is readily available and cheaper to produce. Information awareness is being strategically used to introduce indigenous crops like adlai as an alternative food staple. The research and development (R&D) into an alternative food staple can be considered an alternative plan aside from simply reaching for larger and better rice production.

In terms of the third factor that IRRI pointed out earlier, with regard to land area, farmers are being encouraged and taught specific interventions and technologies on how to grow rice and other crops through integrated cropping system. The Bureau of Agricultural Research (BAR), through its Community-based



Participatory Action Research (CPAR) is aimed at providing farmers with the means, the tools, as well as skills to enable them to maximize the resources at hand. Much of these projects, when handed out to the public, allow them to realize that there is so much more to our country that is currently untapped.

The potential to yield rice production that can answer not only our country's demand but that of others as well is lying in wait. Publicly-funded projects are raising awareness towards far flung areas that can add efforts and resource in answering the call of demand for rice.

Utilizing what this country is enriched with, tapping its potential

the fullest, optimizing efforts in terms of funding, and infrastructure, will definitely provide the right impetus to achieve what at first seemed to be a dream only—a rice self-sufficient country! ###

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# RICE-ing above the problem

BY MARIA ANNA M. GUMAPAC



**A**griculture Secretary Proceso J. Alcala once stated, that in spite the problem our country faces in terms of rice production and supplying the huge demand that we are clamoring for, he assured that, rice self-sufficiency is possible, and will become a reality by 2013.

Rice is one of the country's staple foods and the demand is rising, but the supply seems to be staggering.

In the hopes of resolving the issue of rice demand and producing enough for the country and its people, the Bureau of Agricultural Research (BAR), through its banner program, the Community-based Participatory Action Research (CPAR), is working on taking steps to make Secretary Alcala's assurance a reality.

The CPAR program aims to design and implement an integrated production management system in the community. In collaboration with the Agricultural Training Institute (ATI), the program employs the participation of the community to emphasize the value of the information-based decision-making. The participatory nature of CPAR intends to focus on the orientation of overall management of

production system, which includes farming systems development, resource management orientation, community-based, whole farm and whole family systems approach, as well as its complementation and integration.

In CPAR, farmer cooperators become the direct beneficiaries as they are also involved in the implementation of the project. Meanwhile, the adoptors are indirect beneficiaries who willingly adopted the technologies and interventions introduced in the CPAR project after seeing how effective they were in the farmers' fields.

One of the BAR's funded CPAR projects is based in Magalang, Pampanga, focusing on integrated rice and off-season vegetable production in the towns of Sta. Cruz and San Vicente.

The problem on food production is not an isolated case as there is an ongoing struggle on a global scale. The difference, however, lies in each country's response and resolutions that they come up with in order to ensure that supply will always be able to meet the demand.

Due to this, increasing what one can squeeze out of what resource

they have on hand is inevitable. It is imperative to help farmers produce as much and as efficiently as possible to increase the capacity to produce food.

Project proponent, Dr. Marcelina M. Cangco, reported that the demands of the community for land will grow at an increasing rate, thus it is important to prompt agriculture to its optimum potential to increase its efficiency of land use to produce even more, from a lesser land.

New technologies were also developed in response to the aforementioned dilemma. Technologies for both rice and off-season vegetable production are now available for farmers. It is with these technologies that the proponent hopes to alleviate their income level, profitability will be achieved.

As most vegetable growing areas in the province often produce during regular season, this practice allows over supply to occur. Afterwards, during the off season, demand is high but the supply is low. Sta. Cruz and San Vicente in Magalang, Pampanga were deemed potential sites for off-season vegetable production. An added point is that the farmers were willing to adopt new technologies. Thus, the project was conceived.





### **“Rice” to the occasion**

This project utilized the following materials: certified rice seeds (inbred and hybrid), complete fertilizer, organic fertilizer, pepper, eggplant, tomato seedlings, plastic mulch, and seedling trays.

Rice production followed the traditional method for land preparation in this project. Integrated Pest Management (IPM) as part of an ecological and environmental-friendly pest control was adopted and rice was harvested upon 85 percent maturity of its grains.

Vegetable production, on the other hand, was initially planned to be planted simultaneously as scheduled with rice crops. However, due to delivery delays, the vegetables were planted two weeks after transplanting of rice.

Ten farmers cooperators participated: four of them planted pepper, three planted tomatoes, and the remaining planted eggplant. Each commodity utilized 400 square meters, and the combination of organic and inorganic fertilizer were applied before transplanting, and were covered in plastic mulch.

The second year of the project found that the farmers who participated doubled in number. The activities employed by the project involved a Participatory Rural Appraisal (PRA), conducted in Sta. Cruz Chapel at Sta. Cruz, Magalang. This was done in order to gain a baseline data regarding the community and cooperative that was set to participate. Several meetings were held by the cooperative to discuss CPAR mechanics, as well as protocol and selection of cooperators.

The rice component was transplanted from June to July in 2009 and 2010. Vegetables were planted in August during its first year and July during its second year.

In addition, a Palay Check Farmers Field School (FFS) was included into the project, which started in July of 2010 to November of the same year. This activity was participated in by 26 farmers. It is noteworthy that the farmer cooperators learned the eight key checks of the Palay Check FFS.

All throughout the project, regular monitoring was notably implemented.

And despite the challenges encountered such as reluctance of some members to participate fully, other cooperators backing out, natural calamities, pests and diseases, it is heartening to realize that the end of the project realized a promising crop combination with rice and vegetable production. These problems were overcome and the farmers showed a gain in income, all while waiting for the main crop to be harvested. Their income—and in turn, their lives—need not be put on hold as well while waiting for the rice to... well, rise.

Projects such as this are the kind of encouragement we can give rice producers who are the first in line to answer our issues with rice demand versus supply. If we can empower these people, provide them as this project has with the right tools, the proper information, as well as the motivation to succeed, then we may just as well be halfway there to reaching rice self-sufficiency in time. ###

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The article was based on the study, “Community-based Participatory Action Research on Rice + Off-season Vegetable Production in Sta. Cruz and San Vicente, Magalang, Pampanga,” by Dr. Marcelina M. Cangco, Chief of the Research Division of Office of the Provincial Agriculturist-Pampanga.





# CORN:

BY LEILA DENISSE E. PADILLA

## Optimizing productivity and competency

**N**ext to well-liked rice, corn (*Zea mays* L.) comes as the second most important crop in the Philippines. It is vital in the advancement of livestock and poultry industries, with 60 percent of its total production yield used as feed and the remaining 40 percent used as food and other products.

However, according to the National Corn Program of the Department of Agriculture (DA), on a national average the corn production in the Philippines is still not enough.

### Low corn production

Compared to Thailand, Argentina, United States, and other major corn-producing countries, the Philippines lags behind with its average corn productivity of 3.21 metric

tons/hectare (mt/ha) as recorded by DA. Despite the increasing demand for corn, (white consumed as staple by around 12 million Filipinos and yellow wherein approximately 70 percent is used as feeds for livestock), overall production is low and insufficient.

One reason seen as an impediment is ecosystem-related challenge, specifically, climate change, which causes the incessant occurrence of calamities like severe drought and typhoon. Any crop plantation in the Philippines, even that of corn, can be heavily damaged if any of these two calamities occurred, posing threat to production yield and profit and causing delays to farming activity schedule.

Insect pest infestation also causes severe damage and leads to yield decline and more frequent application of pesticides. Corn borer

and corn plant hopper are among the insect pests that have raised concerns in this matter.

Plant diseases, like corn rust, corn downy mildew, and corn leaf spot, are caused by microorganisms such as fungi and bacteria. These occur when a plant is in a state of vulnerability (e.g., open wounds or cuts), when the source of infection is present, and when the environmental condition is unfavorable. If not cured, these diseases can degrade the quality of harvest.

Another problem identified is chemical dependency of farmers. The frequent use of chemicals like pesticides and synthetic fertilizers is commonly practiced in traditional farming of any crop for it provides instant relief and improves production and yield.

However, this practice can bring severe effects in the long run. Soil





infertility, pesticide resistance of insects, and human health hazards are among the negative impacts of regular chemical use and these do not only impose threats to production stability but also to the environment and human health.

The global market is open to highly-competent and stable industries that can provide excellent products and services. However, according to the corn industry overview of DA's Corn Program, vital factors such as technology modernization, postharvest quality, and transport and market costs continue to serve as challenges.

In the Philippines, there is a trend that constrains the domestic corn sector to flourish and attain self-reliance and hinder its path to the global market. According to the DA Corn Program, these included: 1) low adoption of modern corn production technologies, 2) high post harvest losses, and 3) high transport and marketing costs due to inadequate infrastructure.

#### **R&D efforts and strategies**

To increase productivity and production of quality corn for human consumption, feeds and industrial uses, as well as improve farmers' incomes and quality of life, the National Corn Program aims to: 1) increase average corn productivity from 3.21 mt/ha to 5.0 mt/ha; corollary, to decrease current average production costs by at least 20 percent; 2) increase farmers' adoption of the yellow corn hybrid technology; 3) produce quality corn and decrease post harvest losses by 5 percent through timely and proper harvesting, shelling, drying and storage techniques; 4) increase the incomes of corn farmers by insuring at least 50 percent return on the investments, and by improving productivity of labor; 5) stabilize prices at levels equitable to farmers, consumers and end users; 6) ensure corn-based farming systems technology development and transfer system; and 7) improve and

institutionalize linkages between and among the DA, local government units (LGUs), non-government organizations (NGOs), peoples organizations (POs), state universities and colleges and (SUCs), and private sectors.

The program also conceptualizes a new paradigm for the country's corn sector that is farmer-focused and agribusiness-oriented. This paradigm is not only aid in the transformation of farmers into agri-entrepreneurs through productivity enhancement projects and human resource development activities but also springboard the transformation of corn from being a low-value commodity to being a price-steady high-value product through product development and value-added processing schemes.

Research and development (R&D) efforts in agriculture have been hailed for creating and finding new opportunities and developing what's already on the table. As DA's R&D





“**Achieving food security and alleviating poverty and famine, the National Corn Program is adopting strategies with high hopes and cooperation from all concerned sectors, that this goal will become a reality.**”

arm, the Bureau of Agricultural Research (BAR) supports projects on corn that lead the farmer sector to new strategies and techniques not only to develop their skills as agriculturists and entrepreneurs but also help them obtain stable productivity and better harvest.

Through BAR's flagship programs – Community-based Participatory Action Research (CPAR) and National Technology Commercialization Program (NTCP) – projects on corn-based farming systems, corn variety development, corn production optimization, and more are assured with financial and technical assistance. Most importantly, these projects provide opportunities for the sector specifically, in building and strengthening their network and linkages, making production more productive and efficient.

Achieving food security and alleviating poverty and famine, the National Corn Program is adopting strategies with high hopes and cooperation from all concerned sectors, that this goal

will become a reality. Among these strategies are: 1) area-based approach towards a more focused interventions; 2) productivity improvement to enhance competitiveness; 3) focused targeting for tangible results; 4) LGU-led program implementation for immediate assistance; 5) participatory approach for better stakeholder involvement; 6) counterpart schemes for organized financing arrangements; 7) capacity-building to strengthen farmer expertise and entrepreneurship; and 8) private sector partnership for more investments.

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# OPV white flint corn:

## A-maize-ing cheap alternative to hybrid

| BY LEILA DENISSE E. PADILLA

**A** new and improved open-pollinated white flint corn variety called, IES 09-2 was developed by the Department of Agriculture-Cagayan Valley Integrated Agricultural Research Center (DA-CVIARC), Regional Field Unit (RFU) 2. This is a result of a research and development (R&D) efforts with the Bureau of Agricultural Research (BAR) through its Community-based Participatory Action Research (CPAR) program. The OPV variety passed the National Cooperative Test (NCT) and

was approved by the National Seed Industry Council (NSIC) in 2011 with Registration No. Cn 2011-260.

### **Cheaper, sustainable option to hybrid corn**

The high cost of hybrid corn seeds together with its costly production could not provide farmers with a sustainable yield and reliable income. With the goal to help in the enhancement of corn production in the Philippines, BAR supported DA-CVIARC in developing and improving the open-pollinated variety (OPV) on white flint corn.

OPV corn is what farmers used to plant until the hybrid varieties were introduced. Unlike the OPV corn, hybrids attain higher harvest and uniform-sized cobs due to homogeneous genetic content. These are the qualities that promised better production and income, hence encouraging farmers to plant hybrids instead of OPVs.

However, it was found that hybrid corn is more preferred by the corn borer insect pest, which causes damage and depletes quality and quantity. Also, hybrid corn requires more expensive inputs, hence



## Good Agricultural Practices

### Corn Production Demonstration

#### Interventions:

- ✓ Basal application of organic fertilizer
- ✓ Application of bio-control agents:
  - Trichogramma, Earwig and Metarhizium



increasing the cost of production. Another concern is the repeated purchase of hybrid corn seeds because the subsequent seeds do not retain the heterosis (hybrid vigor), which is the characteristic that carries the superior quality of a hybrid.

With these setbacks, researchers and agriculturists gained a renewed interest on corn OPVs, focusing on developing and improving these varieties.

#### Improving OPV on white flint corn

Being the center for corn breeding in Region 2, DA-CVIARC was mandated to develop high-yielding, pest- and disease-resistant OPVs of white flint corn to address the need for high quality corn seeds in the region. Cagayan Valley is one of the major white corn producers in the country, mainly because of its corn-eating culture.

DA-CVIARC sees the potential of corn as an alternative staple food because it is easier to grow than rice with lesser water requirement. However, hybrid corn seeds as promoted and used by many are expensive and could not be obtained repeatedly by marginal corn farmers in the region, hence the development of high-quality OPVs.

According to CVIARC's corn breeder, Severino C. Tumamang, OPV seeds are 80-85 cheaper than the hybrids and its seeds could still be

recycled as source of seeds.

Specifically, the project aimed to: 1) develop high-yielding white flint corn open pollinated varieties (OPV) with improved agronomic traits and eating quality, and 2) support the needs for improved corn OPV of the traditional corn-eating farmers in Region 2 and other regions who are planting open-pollinated white corn varieties.

The development of improved white flint OPV corn will not only enhance the farm productivity of resource-poor farmers but will also contribute to the population improvement initiatives on enhancing corn germplasm (the collection of an organism's genetic resources).

The project performed five stages before a new and improved white flint OPV corn was developed. These are: 1) germplasms collection and evaluation, 2) population improvement, 3) downy mildew screening nursery, 4) variety formation and evaluation, and 5) variety maintenance of experimental varieties.

During the harvest, the crops were selected based on standability, prolificacy, disease-tolerance, ear-size, and physical appearance. After passing the promising varieties to NCT, only IES 09-2 met the requisites and it was commended by NSIC for commercial production as staple last year. It is

moderately resistant to pests such as earworm and corn borer and is defiant to diseases such as corn rust and stalk rot.

An area of 0.25 hectare at the DA-CVIARC Corn Seed Production quarter was allotted for production of breeding seeds to ensure the availability of the basic seeds of IES 09-2.

In a report submitted to BAR, it was underscored that "a volume of 1,500 kg breeder seeds for IES 09-2 is available for the production of foundation seeds at DA-CVIARC and for other seed growers."

DA-CVIARC and BAR hope that with further research and support, more improved corn OPVs will be developed, thus helping in the country's ultimate goal of food self-sufficiency. ###

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# Cassava:

## The staple food of the masses

BY DIANA ROSE A. DE LEON



**V**ersatility is what best describes root crops. They are reliable and dependable source of food, feed, and medicine; an essential raw material for commercial and industrial products; and most importantly, cash crops among the farmers.

Given that the country's food productivity is lagging behind its neighboring countries, one of the strategies developed by the Department of Agriculture (DA) is to intensify the promotion of other equally nutritious commodities as an alternative to rice. This leads to the drafting of the Philippine Food Staples Self-Sufficiency Roadmap (FSSR) in which through increasing the consumption of non-rice food staples, Filipino dependency on rice is lessened and rice self-sufficiency can be achieved by 2013. These non-rice food staples include white corn grits, *saba*, *adlai*, and rootcrops such as taro, sweet potato, and cassava—the food staple of nearly a billion people worldwide.

### The all-in-one crop

Cassava (*Manihot esculenta*) plays an important role in suppressing hunger in many marginal communities globally. According to the Food and Agriculture Organization (FAO), more or less a billion people depend on cassava as food staple in 105 countries. Widely grown in tropical Africa, Asia, and Latin America, cassava is the fourth most important crop in developing countries.

The crop is a drought-tolerant shrub cultivated mainly for its tuber. It can grow in any soil type and can provide a good yield even in poor soils. Aside for its food function, cassava is utilized as raw materials of various products such as feed, starch, alcohol, and bio-ethanol.

It is the cheapest source of starch (also called tapioca starch) which is used in more than 300 industrial products such as confectionary flour, thickener paste, binder and stabilizer for many processed food products, pharmaceutical, textile, mining, manufacturing, among others.

### Is it safe?

One of the limiting characteristics of cassava is its toxin content. It contains cyanogenic glucosides that discharges cyanide (a poisonous substance for human) in its tubers and leaves. However, the amount of the cyanide varies depending on the cultivar and growing conditions.

“Sweet varieties” usually have small amounts of toxins (that is why they are preferred as food) compared

to the “bitter varieties” which must undergo appropriate processing to remove the toxins. Different methods of detoxifying cassava have been developed. The most popular and easy method is through boiling and drying.

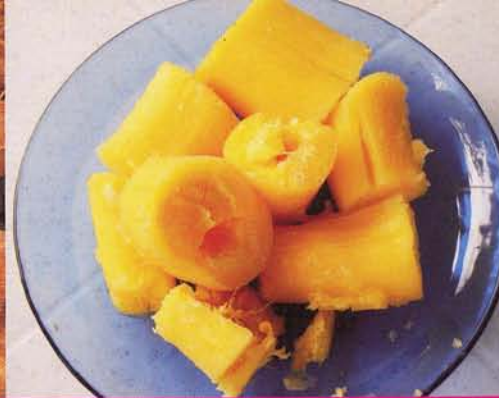
Another pressing issue in cassava is its low protein content. Although cassava leaves contains more protein, the tubers were the frequently consumed by human. The protein content of cassava is in the borderline of one percent, and may cause protein deficiency if consumed in large amounts and with no other food accompaniment.

Its low protein content is appeased by its high carbohydrates content. It is third highest source of carbohydrates next to rice and corn, and a good source of calcium and vitamin C. It is suitable for people who are trying to gain weight.

As food, cassava remained a reliable food in times of crisis. It is claimed that it can stay for three years in the ground prior to harvesting.

In the Philippines, the traditional methods of preparation are through boiling, mashing, and frying. It usually served as a dessert such as pudding, chips, cassava cake, cassava balls,





pancakes, or coated with caramelized sugar.

### Cassava in the Philippines

Popularly known in the Philippines as *balinghoy* or *kamoteng-kahoy*, cassava is utilized mainly as food, dried chips for feed, and starch, and contributes about two percent to gross value-adding in agriculture. It is the staple food crop of those in Sulu Archipelago and Muslim population in Lanao and Cotabato, making Mindanao the top cassava producer of the country, and Autonomous Region in Muslim Mindanao (ARMM) the top regional cassava producer, accounting to 57 percent of the country share.

Nonetheless, cassava industry in the Philippines is bleak in comparison to the other Asian countries such as Thailand, Indonesia, and Vietnam. Even though it is among the top root crops cultivated in the country, its purpose is for subsistence only.

According to studies, cassava is one of the commodities that receive poor attention when it comes to research and development (R&D) interventions, thus, attributing to the lack of commercial-scale, high yielding and quality cassava.

Based on a report, other factors deterring the Philippine cassava industry are low adoption of the recommended cassava production technologies, high wastage/losses during harvest and postharvest handling and processing, limited planting materials of high-yielding varieties, lack of location-specific cassava production technologies, and low consumption, among others.

### R&D efforts to boost cassava industry

With the government serious on putting back again the Philippine cassava on the map of leading economically-valued agricultural commodities, a cassava program is conceptualized. This is under the DA's Corn Program and the High Value Crops Development Program (HVCDP). The program focuses on three major interventions: 1) mass propagation of new varieties with high yield potential; 2) providing postharvest equipment such as cassava chipper or cassava granulator to cut short the processing time, and; 3) conducting trainings to capacitate the stakeholders including DA-Regional Field Unit (RFU) 1, local government unit (LGU) extension workers, and farmer leaders, and producing IEC materials for information dissemination.

The Bureau of Agricultural Research (BAR) included cassava as one of the priority commodities in its 2011-2016 Research and Development, Extension Agenda and Programs (RDEAP). The RDEAP look into the dilemmas, researchable areas, expected outputs, and concerned implementing agencies in the cassava value chain. To date, there are 11 cassava-related funded projects being implemented by BAR.

### Future directions

The DA has been proposing the 2012 budget for cassava and corn development worth P950 million pesos which is doubled that of 2011. Additional budget proposals worth P300-600 million has been lobbied which when approved could bring the total budget allocation for these two

commodities to 1.5 billion.

The cassava sector has already formulated its roadmap for 2011-2016 which focuses on increasing cassava production (fresh roots) from 2.10 to 8.28 million metric tons (mt), increasing the national average yield of cassava from its current 9.63 mt per hectare to 20 mt per hectare, improving the quality of cassava primary products, and increasing the per capita consumption of cassava to five kilograms per year. ###

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# Cassava chips, the crunchy delight of Eastern Samar

BY DIANA ROSE A. DE LEON

**T**he importance of cassava as a crop cannot be disputed. It is an important raw material for various commercial and industrial products and a staple food for many marginalized communities worldwide.

Given the large market niche and its economic viability to help the smallholder farmers, the Bureau of Agricultural Research (BAR), through its banner program the Community-based Participatory Action Research (CPAR), has been supporting endeavors in improving the cassava industry in the country. As a priority commodity for research and development (R&D) interventions, the issues surrounding this particular commodity have been given particular attention and appropriate actions.

Being a highly perishable commodity (deteriorates 1-3 days after harvesting), different preparation techniques had been developed to prolong its shelf life and be a functional food that is safe for human consumption. Cassava chips processing is an example of food preparation which is simple, and yet can be a lucrative enterprise.

## CPAR on cassava chips processing

In Salcedo, a rural municipality in Eastern Samar, cassava chips processing is one of the additional sources of income of the local residents. Lacking on befitting production and processing technologies, led for the implementation of a CPAR on cassava chips processing in the locality. The project is being implemented by the Eastern Visayas Integrated Agricultural Research Center (EVIARC), Regional Field Unit (RFU) 8 led by its manager, Dr. Elvira C. Torres.

The project was designed to make their locally produced cassava chips at par with those available in the market by means of capability enhancement, integration of the matured technologies to their current processing practices, and devising appropriate marketing strategies. The project also takes into account that there should be a sustainable production of cassava tubers and increased productivity through the use of new and improved cassava varieties, and incorporating to the farming practices the use of organic fertilizer.

Through improving cassava chips preparation and processing techniques, add-ons flavoring, acquiring new processing equipment, and developing an attractive packaging and labels, the proponent is optimistic that the project will help to have a significant increase on the income of the beneficiaries.

Specifically, the project was intended to benefit the members of Eastern Samar Entre-Pinoy (ESEP) Workers Association, Inc. in Brgys. Malbog and Naparaan, Salcedo.

## Strengthening cassava chips industry

To prepare the association on the intricacies of venturing in cassava chips enterprise, they had undergone series on trainings, seminars and workshops on chips preparation, frying and packaging, flavor enhancement/fortification, operation of new processing equipments, farm planning, training on cassava production, value formation and enterprise development.

The project had been so far accomplished the acquisition of new processing equipment, flavor enhancement such as original flavor, cheese, sugar, adobo, cinnamon, garlic, honey and spicy flavors; improvement of





product quality in terms of product appearance, shelf-life, packaging and label, and raw material traits; participation in local agri-fair product exhibition; and establishing a demonstration farm with locally available cassava varieties intended for gene bank collection.

Aside from the support of the LGU of Salcedo, through the project, it was able to establish linkages with various government and academic institutions giving it the much needed technical assistance and support including the Visayas State University (VSU), Eastern Samar State University (ESSU), Department of Trade and Industry (DTI), and Department of Science and Technology (DOST). They also tapped the Gawad Kalinga, a non-profit organization, for provision of cassava chips processing center. The ESEP workers are currently working out a partnership with the German Embassy in funding the construction of the cassava processing and display center.

As to date, the cassava chips products of Salcedo are being sold for Php5 per 200 grams which generating an average income of Php50 – Php175 per day – not bad as an added income.

The products were marketed at canteens of school campuses, public market stalls, bus terminals, VSU Technomart, and other retailers within Salcedo and neighboring municipalities.

With the introduction of CPAR in the community, cassava production is now given much attention by the LGU. Cassava farmers are now knowledgeable on the right variety of cassava to use and its cultural management, thus, increasing farm productivity.

The time left for the conduct of the project will be allocated for the construction of display center which is in accordance with good manufacturing practice (GMP), sustaining the cassava chips production (100 – 200 packs/processor/week), nutritional analysis of the product, conduct of farmer's field day, and participatory

agro-ecosystems analysis for the development of a suitability map for cassava production in the whole province.

With the feats achieved by the project, the project team is already working on the sustainability plan and to draft another project proposal for the commercialization of cassava processed products, and the ESEP association is planning to include in their cassava product lines the cassava cake and production of cassava grates. ###

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This article is based on a CPAR project titled, "CPAR on Cassava Chips Processing in Brgys. Naparaan and Malbog, Salcedo, Eastern Samar", being implemented by the Eastern Visayas Integrated Agricultural Research Center (EVIARC), DA-RFU VIII, Babatngon, Leyte.

For further inquiries, please contact Dr. Elvira C. Torres, EVIARC manager and project proponent. You may contact her through her telephone # (053) 321-3154 or through her email address, lvctorres@yahoo.com

**With the introduction of CPAR in the community, cassava production is now given much attention by the LGU. Cassava farmers are now knowledgeable on the right variety of cassava to use and its cultural management, thus, increasing farm productivity.**



# Sweet potato:

## Nangangamote no more

BY ZUELLEN B. REYNOSO

**T**he popularity of sweet potato, locally known as *kamote*, dates back as far as the saying “nangangamote ako” was first coined in Filipino culture—a negative connotation, which when translated is set to mean one is doing poor in something, like schoolwork for instance (“nangangamote ako sa eskwela”, in English is “I’m doing poor in school”). Attributed to the old-fashioned belief that only the lower classes produce and patronize the crop, today’s research and development (R&D) initiatives are shining light on a more positive, definitely more appealing side of *kamote* production and consumption.

### Eat *kamote*, the musical fruit

Playfully termed as “the musical fruit” meriting its own soundtrack in the Filipino culture, sweet potato (*Ipomoea batatas* L.) is one of the most well-known and extensively cultivated root crop in the country as its farming requires minimal maintenance and production cost is relatively cheap.

Mostly grown in warm countries any time of the year, the leaves, tops, and roots of *kamote* are largely utilized as either food or feed. The heart-shaped *kamote* leaves are used as vegetables; *kamote* flesh (edible root) with white,

purple, brown, or red skin color utilized mainly as food—even as staple food in Northern Mindanao and numerous other countries.

It is a good source of carbohydrates, carotene, and polyphenolic antioxidants as well as an excellent source of vitamins A–C, calcium, iron, and phosphorus. Its leaves, known as *talbos ng kamote*, is believed to lessen cholesterol and blood sugar levels, and may also be used for treatment of constipation and stomach stress. The nutritional and industrial (utilized in starch production) uses of *kamote* outweigh its disapproving folkloric image.

In the Philippines, *kamote* is cultivated as a basic staple food and used as a special delicacy known as *kamote* chips. Largely a main stay on the *merienda* table as a fried dish (*kamote-q* and *kamote* fries), production of sweet potato is focused mainly in the Bicol province, Eastern Visayas, and Central Visayas regions.

Although the industrial use of *kamote* in the Philippines is considerably superseded by its neighbors from China, Korea, and

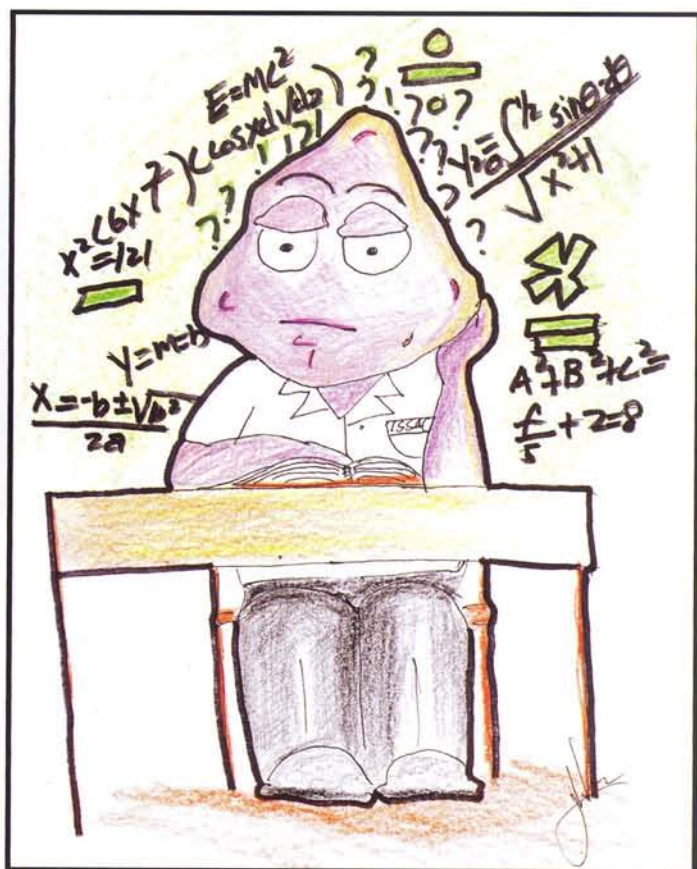
Vietnam where it is being utilized in the manufacture of chemical products, paper, paint, and ink (among others), *kamote* as ingredient in food products such as catsup, jam, soy sauce, jellies and other bakery and nonbakery products (starch and flour) is increasing in popularity in the country.

To date, recipes with sweet potato as ingredient include sweet potato catsup, sweet potato hotcake, and sweet potato as cited in the Sweet Potato Commodity Profile of the Bureau of Plant Industry (BPI).

### The more you eat, the more you toot

Studies show that starchy food (high in complex carbohydrates) such as *kamote* causes flatulence or intestinal gas—however uncomfortable this occurrence may be, Filipinos have continued to see through this minor setback. (Hence, “the more you eat, the more you toot. The more you toot, the better you feel” lines from the *Kamote* song.)

Promotion of sweet potato production and consumption is a continued collaborative effort by the Department of Agriculture (DA)



graphics by JAVENDANO





specifically, the Bureau of Agricultural Research (BAR) wherein it is included as a priority among the root crops.

Under the Philippine Food Staples Self-sufficiency Program (FSSP) 2011–2016 that aims to achieve rice self-sufficiency by 2013 in the country, sweet potato plays a major role in realizing this goal. Strategies to solve the food scarcity issue in the country by managing rice consumption include increasing food staple supply by 3.5 percent annually and making these crops affordable and available to everyone. Apart from sweet potato, white corn and cassava are amongst the promoted food staple crops that will help achieve this 2013 goal.

Sweet potato is a very resilient crop, especially in the tropics with weather like the Philippines. With little intervention needed to produce sweet potato, farmers are able to invest minimally; with the ever-increasing market demands, farmers are able to maximize their investment returns within a shorter period of time. However, varieties available in the country could still be improved, farming techniques and practices could still be refined, and product development on *kamote* could still be enhanced—all to multiply the yield and in turn, provide more for the Filipino farmers and their families.

R&D initiatives on sweet potato have been ongoing to further enhance sweet potato production and to encourage more farmers to plant *kamote*. Various studies have been taken in order to develop all the facets to

producing high-yielding, disease-resistant, sweet-tasting and affordable sweet potato.

In 2009 for instance, the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD), in cooperation with state universities and

colleges (SUCs) and the DA-Regional Field Unit (RFU) III implemented a sweet potato project that aimed to improve the variety available in certain parts of Tarlac and Albay.

Stemming from almost a decade (since 1998) of initiatives on sweet potato production, this partnership with both the private and public sector resulted to a variety of sweet potato that is more disease-resistant and high yielding.

To date, DA-staff bureaus, SUCs, and RFUs continue on in enhancing sweet potato production—a demonstration of complete commitment to the 2013 vision of a self-sufficient Philippines.

### **Eat *kamote* in every meal**

BAR promotes sweet potato farming by implementing various projects that aim to enhance production of the crop in various sites across the country.

Under the BAR's flagship banner programs, the Community-based Participatory Action Research (CPAR), focused on empowering communities with knowledge tools for farming and the National Technology Commercialization Program (NTCP), focused on transferring development, propagation, and management techniques to these communities for proper handling of their agriculture and fishery products — various projects are being undertaken to develop and enhance sweet potato production.

In Ifugao, a CPAR project on

sweet potato production and processing ensued as well as another in the same province that involves root crops and goat farming systems; integrated sweet potato-based farming in Aurora; and CPAR project on diversified processing of cassava and sweet potato. Under NTCP, projects such as the “Technology Commercialization of Protein-Enriched Sweet Potato as Feed for Aquaculture” with the Tarlac College of Agriculture (TCA) is among the many projects undertaken by the bureau and its partners to ensure the adequate and sufficient supply of sweet potato in the country.

Although sweet potato projects around the country may be in its infancy compared to other staple crops, the DA along with BAR, SUCs, RFUs, members of the public and private sector continue on in pushing this cash crop to achieve its maximum capability. Resolving issues on pests and diseases, low yield, and low sale value of sweet potato is already at the forefront of the movement to achieve food stability through self-sufficiency in the country.

There is a need not only to support R&D initiatives on sweet potato, but also to enhance the need to patronize home-grown *kamote*. To do this, there is a need to also encourage farmers to keep planting the crop, and may be soon enough, the Philippine sweet potato will be *nangangamote* no more. ###

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For more information on hot water tanks, you may contact Dr. Kevin Yaptenco at the College of Engineering and Agro-Industrial Technology, UPLB, Tel. No. (049) 536 3291.





# Making farmers' lives “sweeter” with sweet potato

BY ZUELLEN B. REYNOSO

**A** root crop native to the Philippines, sweet potato is one of the most important crops in the country. Locally known as *kamote*, sweet potato (*Ipomoea batatas* L.) is the sweet-tasting root vegetable, distantly related to the potato, which belongs to the Convolvulaceae family.

Also known as *dokto*, *lokto*, *lapney*, and *bayading* in the Cordillera region, farmers cultivate the crop as alternative to rice in areas where the latter is difficult to grow. As *kamote* is abundant in tropical countries like the Philippines, it is a good source of carbohydrates and has long been considered a staple food as it is a cheap source of daily filling, especially in developing countries where resources such as planting materials are scarce.

In the Philippines, product

development of sweet potato has resulted to the production of wine, jam, jelly, soy sauce, and other food products as well as feed for livestock. A result of numerous collaborations amongst government agencies, local farmer cooperators, researchers, and members of the business sector, *kamote* production has now become one of the most income-generating crops that Filipino farmers rely on. Apart from the usual *kamote-que* and *kamote* fries sold in street corners, sweet potato has come a long way from simply being a poor man's crop.

To bring adequate and home-produced food to every Filipino table, the Department of Agriculture (DA) presses on through the Food Staples Self-Sufficiency Program for 2011-2016 that includes sweet potato as one of the priority food staple crops. In this initiative, alternative food staples such

as white corn, cassava, *saba*, and sweet potato become the focus of numerous research and development (R&D) initiatives as they are instrumental in attaining food self-sufficiency in the country. DA staff bureaus, local government units (LGUs), regional field units (RFUs), state universities and colleges (SUCs), and the private sector have been working together in a variety of projects to develop various crop production strategies and interventions—from seed varieties to packaging—to encourage crop production and consumption as alternative food staple.

## Sweet potato production in Aurora

In the province of Aurora where the primary industry is agriculture, product development projects of crops are much needed.





Although most are coconut farmers in the province, *kamote* production runs fourth in the major crops of Aurora. However, because *kamote* is just one of the many major crops produced in the province, appropriate information on production is lacking. *Kamote* farmers are plagued not only with the lack of knowledge in its cultivation but also in product development, which can bring their families additional income.

Apart from the inadequate technical knowledge on product development, basic issues such as pest attacks, occurrence of diseases, and low yield further discourage farmers to continue planting sweet potato. Disheartened by the meager income the crop brings, *kamote* farmers resort to cultivating other crops that are more expensive to produce, but promise a little more than what this crop can offer.

Compared to the previous years however, *kamote* production has gained popularity in Aurora. Nevertheless, the anticipated booming of its supply and demand is hampered by these unresolved issues in production.

### **Making sweet potato sweeter**

In partnership with the DA-RFU 3 and the Central Luzon Integrated Agricultural Research Center (CLIARC), the Bureau of Agricultural Research (BAR), in collaboration with the LGU of Aurora, a project titled, "Community-based Participatory Action Research (CPAR) on Integrated Sweet Potato-based Farming System in Brgy. Calabuanan, Baler and Dikildit, Maria Aurora, Aurora" was launched. Under the CPAR banner program, the project aims to provide additional income to farmers in Aurora by gathering farmer cooperators in two locations—Baler and Maria Aurora, Aurora.

With a two-year project duration, activities such as integration of cultural management of sweet potato, corn production, and goat production, coupled R&D implementation on variety, water, and soil management of sweet potato, farmer cooperators within the province will be given the opportunity to widen their knowledge on the crop production and consequently encourage *kamote* farming. Skills

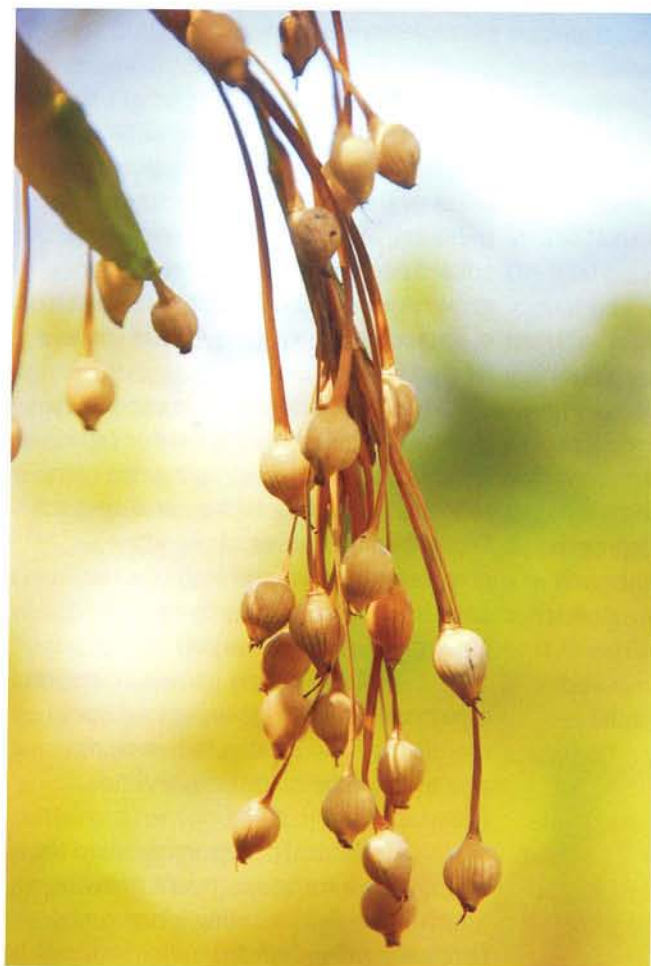
enhancement training courses are also in place, where training on by-products of sweet potato processing will educate cooperators and in turn, improve project implementation and management skills. All these activities for the benefit of the farmers—a little nudge and a little push to help them towards a better quality of life.

The success in making the country self-sufficient in food involves the full commitment of all the sectors. Although Aurora might be just one small province in a large archipelago such as ours, involving local communities in a movement to develop a food staple crop provides a significant contribution to an obtainable goal. A ripple effect will cause neighboring provinces to pay attention to the crop. And may be soon enough, sweet potato will be one of the reasons for making that sweet 2013 deadline. ###

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# ADLAI:

## A never heard of crop that resembles, tastes like rice

BY RITA T. DELA CRUZ

**W**hile many of us have not even heard of adlai, this tall-grain bearing tropical plant from *Poaceae* (grass family), the same family to which wheat, corn, and rice belong, has been abundantly growing in the country and is being cultivated since ancient times as staple food. In Midsalip, Zamboanga del Sur, adlai is extensively cultivated synonymous to rice.

"The Subanen people have been growing adlai for as long as I could remember. When I was still a child, I saw how they plant this crop as source of food," said Terso Balides, a Subanen farmer in Midsalip.

The Subanen people are the aborigines of the Island of Mindanao and considered as the first inhabitants of Pagadian City in Zamboanga del Sur.

Their ancestors have been growing adlai as staple food in the highlands, the way the lowland people eat rice. They commonly grow it in *kaingin* areas, freely branching upright, thriving robustly even in marginalized areas.

Even though adlai is being cultivated since ancient times, a lot of Filipinos are still unfamiliar with the crop. It was only very recently, that adlai is gaining familiarity among Filipino rice-eaters through the efforts of the Department of Agriculture (DA) under the leadership of Secretary Proceso J. Alcala wherein adlai is being widely promoted as one of the staple crops that could possibly bring Filipinos to food self-sufficiency.

In September 2010, the Bureau of Agricultural Research (BAR), as the lead research and development (R&D) agency of DA, was tasked to look into the potential of adlai as an

alternative crop for rice and corn. BAR met with two non-government organizations (NGOs), Earthkeepers and MASIPAG to explore the potentials of adlai. It was found that the crop is abundantly growing in the the country.

"BAR is promoting adlai as one of the important alternative food crops as part of the DA's Food Staples Self-Sufficiency Program (FSSP). Part of the initiatives on adlai are adaptability trials nationwide to assess the performance of the different varieties of adlai which we were able to collect together with our R&D national and regional partners," explained Dr. Nicomedes P. Eleazar, director of BAR.

He added that the results from this will be beneficial for the farmers who want to grow this crop in a commercial range as well as for the agriculture industry given our



current challenge for rice sufficiency.”

### R&D initiatives to promote adlai

Part of the on-going R&D initiatives of BAR on adlai is the documentation of production and indigenous practices of the crop in selected regions of the country. This initiative is conducted specifically to determine production and harvesting practices in adlai growing regions and use the data as technical basis in packaging location specific technologies. This will also provide relevant information for the recommendation of interventions and techniques to improve adlai production.

The project has six components: inventory of adlai varieties, agronomic characteristics of adlai varieties, uses of adlai and reasons for preference of adlai variety, ratoon yield, and production and harvesting practices.

Data were gathered through site visits, observations and interviews with the farmers' associations and their members. The documentation

team from BAR also used a structured questionnaire to determine adlai production and harvesting practices.

The documentation team—composed of technical staff from the Project Monitoring and Evaluation Division (PMED) and Applied Communication Division (ACD) and tapped experts—conducted series of group interview/discussions with key adlai farmer growers in identified growing areas of the country.

The five adlai growing areas include: Region 9 (Midsalip in Zamboanga del Sur); CAR (Sagada in Mt. Province, Kiangin in Ifugao, and Kapangan in Benguet); and Region 10 (Malaybalay in Bukidnon).

Result of the study showed that from the identified five adlai growing areas, it is only in Zamboanga del Sur where adlai was found to be growing robustly and is used as staple food and still cultivated mainly as food source. The use of adlai as staple food in other regions has diminished through time. Also, it was in Midsalip, Zamboanga del Sur wherein adlai

germplasm is mostly rich.

### Adlai seeds and varieties

Through the documentation that BAR conducted in adlai growing areas of the country, it was found that there are at least 11 local varieties of adlai. Specifically, these varieties are grown and widely cultivated in Regions 9, 10, and the Cordillera Administrative Region (CAR).

The 11 adlai varieties are: *gulian*, *kinampay* (*ginampay*), *pulot* (or *tapol*), *linay*, *mataslay*, *bagelai*, *agle gestakyan*, *NOMIARC dwarf*, *jalayhay*, and *ag-gey*. From these varieties, three are commonly grown and found in the country: *gulian*, *kinampay* (or *ginampay*), *pulot* (or *tapol*).

Adlai is widely grown in Region 9 particularly in Zamboanga del Sur mainly for food as alternative to rice and as ingredient for native wine (*pangasi*).

In Midsalip, report showed that from its 33 barangays, 19 are growing 1-3 adlai varieties including *kinampay* (brown), *gulian* (white), *pulot* or *tapol* (red or purple - glutinous) and *linay*





(gold). *Gulian* variety is the most common cultivated variety and is referred to by the locals as “ordinary adlai”. *Gulian* and *kinampay* are the most popular varieties due to bigger size of grains, good eating quality, and higher yields.

According to the farmers in Midalip, they grow adlai with cash crops, including ginger, *gabi*, squash, forest trees and banana. Adlai has a profuse root system anchoring and preventing the big and sturdy tillers from lodging, hence farmers use it as hedgerow to prevent soil erosion.

In Dinas, farmers grow adlai (*mataslai* and *bagelai*) with upland rice. *Mataslai* variety is used for “pangasi” (native wine) and as substitute for rice while *bagelai* is commonly grown as monocrop in small patches of land.

In CAR region, adlai is cultivated for food, but majority for wine-making for special occasions, organic fertilizer (leaves, stems, dry panicles) and grains for feeds for livestock. In Sagada, farmers grow adlai (*gestakyan* variety) and reported that it was introduced to them by a farmer in Malibcong, Abra. For some time, they used it for food, and cooked it just like rice and found it a good alternate for rice. Other varieties of adlai are grown mainly for ornamental purpose, making necklace, rosary, bracelet, and table tray. She chopped the leaves and stems and used it as organic fertilizer.

In Kiangnan, Ifugao, farmers grow adlai (*agle* variety) not for food. They use the leaves as organic fertilizer and its grains for making rosary and necklace. It grows abundantly in idle *kaingin* areas and along barangay roads with irrigation water.

In Kapangan and Benguet, the adlai variety grown is *ag-gey* (*ag-gey* in *Kan-kanaey* and *ag-dey* in *Ibaloy*). It is usually grown for food (roasted for coffee and *sinaing na kanin*) and in small patches in their

backyard and border plants for vegetables. Farmers also used the grains as feeds for cow.

Meanwhile, in Impasug-ong and Malaybaylay, Bukidnon, two adlai local varieties are grown: *halayhay* and NOMIARC dwarf (identified by DA-RFU 10/NOMIARC). *Halayhay* is grown by the Higaunan tribe and is used for wine, snacks (served with *kamote*, *gabi*, and banana).

### Documenting adlai production and indigenous practices

As the result of the documentation conducted by BAR, it was found that production practices are still very traditional, although low cost, environment-friendly, and

sustainable.

For instance, in terms of cropping system, it was found that majority of the farmers grow adlai as mono crop. Others grow them with root crops (*kamote*, *gabi*, cassava), fruit crops (banana) and cash crops (okra, squash, ginger), and forest trees.

Seed selection for planting material is found to be very effective in maintaining the purity of the seed quality. Farmers select seeds for planting materials by selecting long panicles, fuller grains from neck to head, good tiller stand and free from blackish spots or diseases. This careful seed selection is in contrast to what farmers in the lower elevation areas







are doing where there is a very frequent varietal change due to varietal deterioration. In the lowlands, there is a perennial problem of seed source because of the absence of judicious seed selection.

They also use the leaves and other adlai parts of the plants as organic fertilizer. Other production practices include, clearing only the adlai root system areas to prevent soil erosion, and non-application of pesticide to preserve the population of beneficial insects.

Harvesting practices of adlai harvesting is also traditional shredding first the panicles with their hands after which they are milled and winnowed.

Farmers used "bayo" or mortar and pestle or a small wood in pounding adlai grain for food. Farmers' roasts the grains, and pound/grind it continuously, winnow it using "bilao". After series of winnowing, the adlai grits are now ready for cooking.

Yield performance of adlai varieties differs in different elevations. It thrives best in high with and cool temperature, coupled with good fertile soils, good cultural practices, no major pests observed, used of organic fertilizer which resulted to profuse rooting system and profuse tillering. Specifically in Midsalip, among the four varieties, *kinampay* produced the highest yield (3tons/ha) followed by *gulian* and *pulot* (2.8 tons/ha), and *linay* (2.7 tons/ha).

The documentation of adlai production and indigenous practices is critical in assessing the yield performance of different varieties of adlai growing in the area given the different elevations. This, according to BAR will be useful in the promotion and expansion of adlai in the future. ###

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This article was based on the documentation report titled, "Documentation of Adlai Production Indigenous Practices in Selected Regions" conducted by BAR.





# Why eating adlai is good for you

| RITA T. DELA CRUZ

**“Adlai belongs to the family Poaceae or the grasses, the same family to which wheat, corn, and rice belong. It produces good yield in areas where rice and corn hardly grow like the highlands. It can tolerate low pH, poor soil quality, waterlogging and is resistant to pests.**

**S**tanding tall in the wild, adlai (*Coix lacryma-jobi* L.) can be easily overlooked due to its grass-like appearance that blends well with the other wild plants. But unlike weeds, the stem of adlai could grow from 1 to 3 meters tall (from 3 to nearly 10 feet). It bears tear-like shape grains which become the source of (staple) food of many indigenous people particularly in the highlands.

Adlai belongs to the family Poaceae or the grasses, the same family to which wheat, corn, and rice belong. It produces good yield in areas where rice and corn hardly grow like the highlands. Adlai can tolerate low pH, poor soil quality, waterlogging and is resistant to pests.

Just like its counterparts (rice, corn), Adlai is highly nutritious. It is because of this that the Department of Agriculture (DA) is promoting adlai as a staple crop which may well solve the country's chronic palay insufficiency.

To further promote Adlai as a staple crop, the Bureau of Agricultural Research (BAR), as the focal RDE agency tasked to look into the potential of this crop, has been conducting 11 adaptability trials (station and on-farm) of adlai varieties for seed production and commercialization.

Dr. Nicomedes P. Eleazar, director of BAR, explained that “adaptability trials have been established in different parts of the country basically to assess the performance of different adlai varieties





in different locations and elevations. The results will be beneficial for the farmers who want to grow this crop in a commercial range as well as for the agriculture industry given our current challenge for rice sufficiency.”

#### **Adlai is as versatile as rice**

Just like rice, farmers grow Adlai as their staple crop for its good eating quality. Adlai bears tear-shape grains which when matured are harvested, pounded, threshed, winnowed, cooked and served steamed just like rice.

“It looks and tastes like rice, only the grains are a bit larger, “*mas matagal magutom kapag kumakain kami ng adlai*” (we don’t feel immediately hungry when we eat adlai),” said one of the locals from Malaybalay, Bukidnon when they were invited to try the cooked Adlai during lunch.

For those who have tried cooking Adlai, they mentioned that “Adlai takes a bit more time to cook due

to the size of the grains.” Testimonies of those who have tried cooked adlai during a taste-test conducted by BAR also showed that, “Compared to white corn grits, the cooked Adlai grains is softer in texture and more compact.”

As food source, Adlai is as versatile as rice. It can be cooked and processed as main ingredient for the all-time rice-based *kakanin* such as *maja blanca*, *sinukmani*, *chamorado*, *polvoron*, and *turones de adlai* to name a few.

It has a pleasant mild flavor making it a good ingredient in soups and broths. The grain can be ground into flour and used to make breads, pastas, and porridge. The pounded kernel is also made into a sweet dish by frying and coating with sugar. It can also be husked and eaten as it is just like peanuts.

A tea can be made from the parched seeds while beers and wines are made from its fermented grains. Coffee or tea is made from the roasted seed.







## PRODUCTS FROM ADLAI

Nutritive Value	Adlai**	White Corn Grits*	Brown Rice***	White Rice***
Energy (kcal)	356	135	129	110
Carbohydrates (g)	73.9	24.6	27.9	22.9
Protein (g)	12.8	2.6	2.7	2.6
Fat (g)	1.0	0.7	0.3	0.9
Dietary Fiber (g)	0.3	0.7	0.4	1.8

\* Nutrition facts of White Corn Grits (IPB Var 6) released by Crop Science Cluster-Institute of Plant Breeding, University of the Philippines Los Baños (UPLB)

\*\* Nutrition facts of Adlai Grits released by Food and Nutrition Research Institute (FNRI) chemical analysis, 2011

\*\*\* Nutrition facts of White and Brown Rice released by FatSecret All Things Food and Diet ([www.fatsecret.com](http://www.fatsecret.com))

### Nutritive value of Adlai

Eating 100 grams per serving of adlai, one is less likely to feel hungry after awhile compared to eating rice or corn. This is because adlai has the highest food energy content (356 kcal) compared to corn, white rice or brown rice. Hence, a person who ate a cup of steamed adlai for lunch is build to last a whole day's work compared to those who ate rice.

Adlai is also superior to its staple counterparts when it comes to carbohydrate content (73.9 g), protein (12.8 g), and fat (1.0 g). ###

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# "Linay"

## The Golden Adlai

*This variety of adlai is commonly found and cultivated in Midsalip, Zamboanga del Sur*



### FACTS:

Variety:	"Linay"
Maturity:	4-5 months
Color:	gold
Shape:	spherical
Size:	medium to big



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