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Nanotechnology in Agriculture

MICRO INSURANCE IN INDIA
AN OVERVIEW

BANANA PRODUCTION IN INDIA

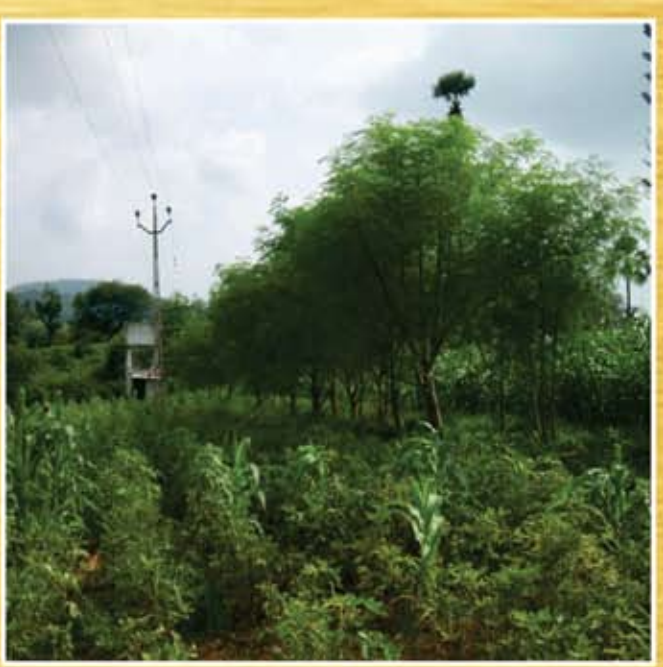
ACTIVITIES OF REGIONAL CENTER–NATIONAL AFFORESTATION & ECO-DEVELOPMENT BOARD

Ministry of Environment & Forests, GoI

Agricultural Finance Corporation Ltd, Mumbai

Activities of Van Kalyan Samiti - Panchala, Dist. Narmada (Rajpipala), Gujarat

A forest on hill that is developed by the Samiti



Plantation of Trees on the Private Land of the Farmer

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EDITORIAL

South America being a distant continent is often off the radar in terms of politico-economic relationships. Of late this has been changing with Prime Minister Manmohan Singh meeting Brazil's first women President Dilma Rousseff this month. We on our part have made an attempt in this direction by interviewing Mr. Fernando Astaburuaga, Director Foreign Affairs, Ministry of Agriculture, Chile during his recent visit to New Delhi. In this exclusive interview we highlight how the Preferential Trade Agreement between India and Chile could be used to mutual advantage especially in boosting agricultural trade.

Over the last few years, 'people participation' and 'empowerment' have become the buzzwords in rural development and local planning. Micro-insurance is emerging as an important facility within micro-finance. Micro-insurance itself has proved to be one of the remarkable phenomena in developing the socio-economic environment of the poor. In this issue we have covered various aspects of micro-insurance and development processes to empower the Indian farmer.

Information and Communication Technology (ICT) can play a significant role in maintaining viable information as it consists of three main technologies. They are: Computer Technology; Communication Technology; and Information Management Technology. These technologies are applied for processing, exchanging and managing data, information and knowledge useful for agricultural information systems.

Education plays a prime role in achieving development in any sector. In this issue, read how management in the agriculture education system is gaining rapid popularity among students.

Profit margins of farmers can be increased with the implementation of plastic low tunnels for off-season fruits and vegetables. We have presented a step-by-step approach to economically create plastic low tunnels.

For cultivating better varieties, we have highlighted the numerous benefits of banana varieties, Seabuckthorn, bitter gourd and Jatropha curcus, also known as Ratanjyot or Jangli erandi, a drought-resistant perennial plant which grows almost anywhere – in marginal/poor soil, gravelly, sandy and saline soils. There is also a study on the technological gap in adoption of recommended soybean cultivation practices and its correlates.

We look forward to your suggestions and comments at fa.afcl@gmail.com.

A.K. Garg
Editor-in-Chief

I N S

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Téte-a-téte with **Mr. Fernando Astaburuaga,**

Director Foreign Affairs, Ministry of Agriculture, Chile

Mr. Fernando Astaburuaga, shares insights on Agriculture and India with Mr. Sandeep Singh *

Que: Chile has high export orientation with aggregate exports of $70 billion or about 40 percent of GDP. The country has positioned itself well as an exporter of agricultural products, particularly fruits and vegetables, and forestry. India is still not a prominent agro-export destination for Chile. Comments?

In 2010, Chile's forestry and agricultural exports to India were for 3.3 percent of total exports to this destination, with an FOB value of approximately US$52 million. Although this amount is still low, it showed a greater than 28 percent increment over the previous year.

Generally, the main barrier faced by Chilean exporters of fresh products, is distance. Today for example, a shipment from Chile by sea takes 45 days to reach the port in India.

When the trade between both countries increases, it will establish direct sea routes which would take 30 to 35 days to travel from Chile to India.

At this stage of development of trade relations between both countries, it is necessary to explore combined alternatives transport (air-sea), in order that fresh produce from Chile can reach their destination in less time.

Despite this, the technological development of Chilean agriculture at the level of orchard and post-harvest has allowed the extension of "shelf life" of fresh produce, beyond what we could imagine.

Another barrier that this market has are tariffs on imported products; an apple that comes from Chile pays a 50 percent tariff, which makes other area markets such as China, Thailand, Vietnam, or even Sri Lanka, more attractive for fresh produce.

Que. What has been the impact of the Indo-Chile PTA, which came into force in September 2007, on the agricultural trade between two countries? How far are the two governments prepared to extend it to Free Trade Agreement (FTA)?

The PTA provides tariff preference set to 178 Chileans products, among which 144 are agricultural and forestry products. For the agricultural products specifically, the PTA does not grant tariff preferences to Chile, so it is necessary to continue working in this area in order to increase the availability of fresh fruit, seeds, etc.., in the Indian market.

Chile and India are currently in the process of negotiation for the extension of the PTA, which may allow extending the number of products with tariff preference to 1,000 products. Once this process is completed, we think that we can begin work on an FTA, allowing inclusion of services, double taxation agreement, investment

protection, etc., which might even include a chapter on business visas, which now is an important issue to be addressed.

The PTA does not allow for development of the potential in economic cooperation and complementarity between Chile and India. Instead, it limits their relationship to an issue of exchange of products, which does not represent the depth of political and commercial relations that both countries have been able to develop until today.

In fact, Chile was the first South American country that had a resident ambassador after India's independence, and this diplomatic representation has remained until today. In other words, Chile believed in India many years ago, when indicators of economic growth, human capital, technology, etc., were not what are evident today.

Que: There are several impediments to the growth of Indo-Chile trade which need to be addressed by both the governments. Phytosanitary and Zoosanitary barriers are a prominent obstacle for the agricultural trade. What is being done to overcome these obstacles?

The phytosanitary and zoosanitary conditions in Chile, allow exporters to access, with their products, the world's most demanding markets like the EU, Japan and Korea, meaning that compliance with the requirements of India is not necessarily the main problem. The biggest barrier that we have faced so far is the difficulty for the phytosanitary and zoosanitary requirements to be established by the authorities in India, so as to open the market for a product.

If this barrier could be overcome more quickly, Chilean producers and exporters could know in advance the conditions required for marketing their products in India, and at the same time, our internal control systems could ensure compliance with these requirements.

In this connection, we are working in coordination with the authorities in India to gain access to outstanding product market (both Chilean products and products of India), and we hope that this work could be reflected in the new products available in the market in the medium term.

To overcome the obstacles that may arise in the future with respect to these materials it is essential to develop communication channels that allow questions to be answered and resolve technical disputes. For this reason, our office is working to develop this channel with the authorities in India.

Que: Another barrier to agricultural cooperation is the lack of mutual awareness of the business opportunities offered by the two countries in this sector. What is being done in the area of Trade Promotion keeping in mind your personal expertise in managing trade fairs? Is your office planning any India specific promotional activities?

Our office is working in coordination with the Office of ProChile in India, in the programming and execution of promotional events.

Moreover, soon we will launch a web portal and a newsletter in English, which will be useful to present information relevant to the Chilean Market and opportunities it offers to audiences in India.

Additionally, we are working to create a "guide" to do business in Chile, which will also be in English, and will be distributed, to Chambers of Commerce and private business interests in India.

Que: How will you describe your visit and dialogue with Indian officials in New Delhi?

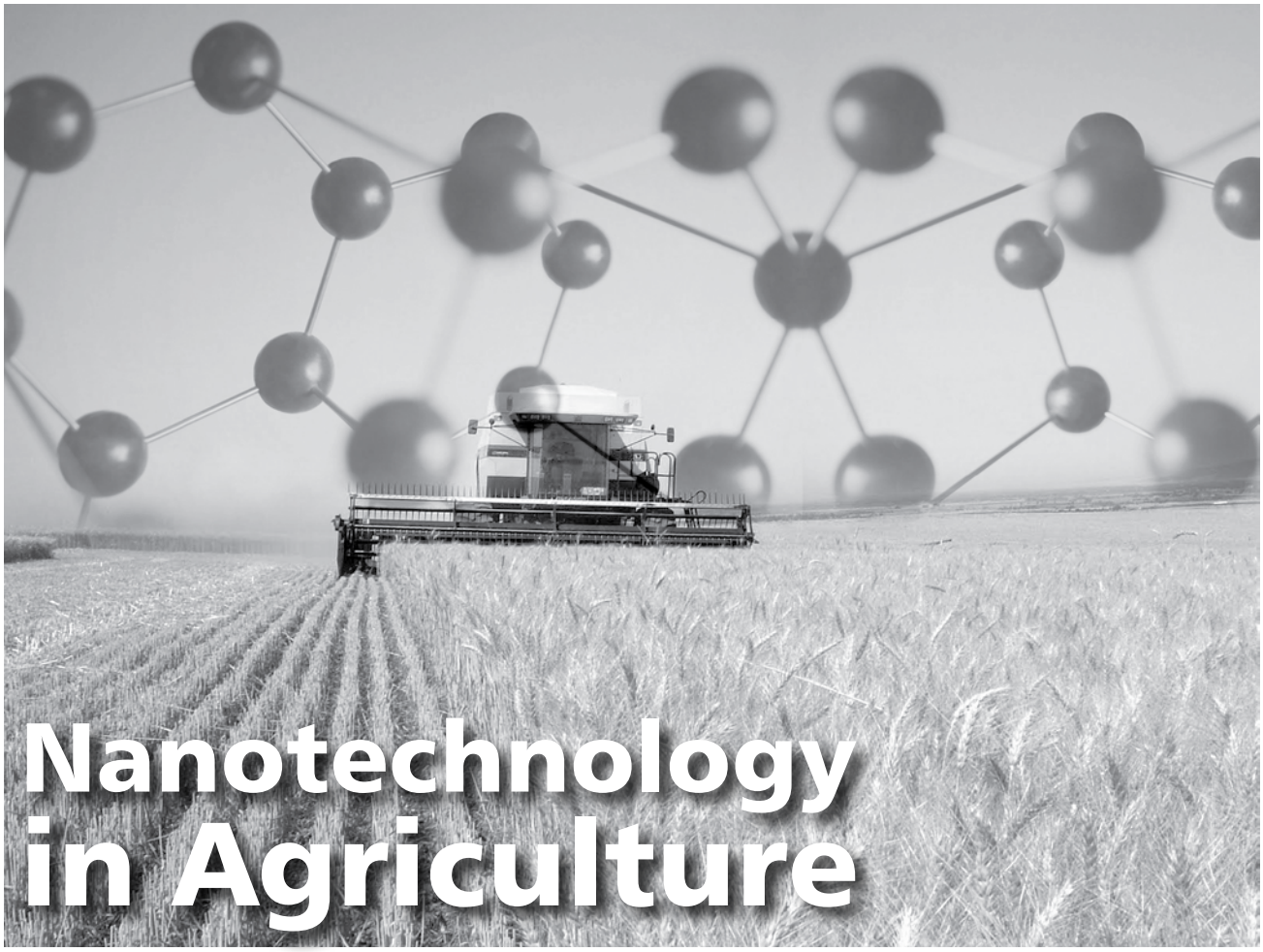
It was a very productive visit, which gave me the opportunity to visit India again after 10 years. I saw a modern and growing country, but also one which preserves and protects its traditions.

Both meetings were very interesting, first, with Mr. Prabir Kumar Basu, Secretary, Ministry of Agriculture & Cooperation; we discussed the prospects for expanding the existing PTA, and possible scenarios for the granting of tariff reduction products from Chile.

We could also discuss the pending issues related to the establishment of phytosanitary requirements for admission of new Chilean products to India, and new products from India to Chile.

Finally, I had the opportunity to meet Mr. Rajiv Mehrishi, Additional Secretary ICAR & Secretary DARE, a meeting which also included the vast majority of the directors of the various departments of ICAR, where we talked about reactivating the MoU signed some years ago.

Source: Editor, Diplomatist Magazine



Nanotechnology in Agriculture

By **Mr. Parveen Kumar ***

The word Nanotechnology was coined by a Japanese Engineer Norio Taniguchi and Dr. Kim Erec Drexler, an American Engineer who is credited with popularizing the potential of Nanotechnology. It is the manipulation of individual atoms and molecules into structures to create new products. Nano particles can be made by top down approach by reducing the size of the smallest structures to the nanoscale and the bottom up which involves manipulating individual atoms and molecules into nanostructures. The definition of Nanotechnology is based on the prefix 'nano' which is from the Greek word meaning "dwarf". In more technical terms, the word 'nano' means size of one billionth of something and is generally used when referring to materials with the size of 0.1 to 100 nanometres, however it is also inherent that these materials should display different properties from their micro or macro scale in terms of their physical strength, chemical reactivity, electrical conductance, malleability, ductibility, magnetism and optical effects.

Nanotechnology in Agriculture

The current global population is now well above the 6 billion mark with Asian countries accounting for more than fifty percent of the total. The Asian countries are suffering from chronic hunger, low farm yields per hectare, mostly marginal and small farmers, degraded lands, threat of climate change, non profitable farming due to high cost of inputs. Besides these, the sector is facing new challenges which include a growing demand for healthy safe food, an increasing awareness about risk of disease and threats to agricultural, livestock and aquatic production from changing weather patterns. Nanotechnology brings with it the tools for the molecular treatment of diseases, rapid disease detection, enhancing the ability of plants to absorb nutrients etc. It thus has the potential to revolutionize agriculture.

Nanofertilizers and Growth regulators

Nanofertilizers have emerged as an alternative to conventional fertilizers for slow release and efficient use of water and fertilizers by plants. These prevent build up of the nutrients in the soil thereby eliminating the risk of eutrophication and drinking water contamination. The first nano-organic-iron chelated fertilizer in the world produced in Iran is reported to have unique features like ultra high absorption, increases production from 20 to 200 percent, results in a rise of Photosynthetic rate by 3.5 times and a 70 percent expansion in the leaves. **Lithovit** is also a naturally occurring CO_2 foliar

spray made from Limestone deposits. It enhances the plant growth and results in high productivity by means of increasing the natural photosynthesis on supplying carbon dioxide (CO_2) at optimum concentration, which is much higher than that in the atmosphere and at the same time does not result in an increase of the CO_2 in the atmosphere which might create a climatic problem particularly when threat of global warming looms large over agriculture. All **Lithovit** particles do not penetrate the stomata at once. Most of them remain as thin layer on the leaves surface and penetrate frequently when they get wet by dew at night. Similarly, **Nano-Gro** is also based on cutting-edge agro Nanotechnology to create stronger, bigger, healthier plants, in a cost effective simple way.

The active ingredients in **Nano-Gro** come as a package in coded sugar pellets less than 1/8 inch diameter. These pellets are dissolved in ordinary water to create a powerful working solution. Just one pellet is capable of treating 42 kgs of wheat seeds or 33 tomato plants. At this rate, one kilo of **Nano-Gro** can be used on enough seeds to plant 3,333 hectares of wheat or almost 7,00,000 tomato plants. **Nano-Gro** is a plant growth regulator and immunity enhancer. Employing chemical concentrations in the order of one part per billion, **Nano-Gro** stands apart from any product in the market. Different from fertilizers, **Nano-Gro** is not a source of nutrients for the plants. **Nano-Gro** does not contain hormones and does not, in any way, change the genetic structure of a plant. **Nano-Gro** helps the plant naturally experience improved growth and enhanced health benefits resulting from the proper application of the principles of Agro Nanotechnology. Results show an increase of about 10 percent in both protein and sugar content of treated plant for most types of crops.

Precision Farming

Precision farming is used to obtain maximum output with minimum inputs through monitoring environmental variables and applying IT enabled targeted action. It makes use of computers, global satellite positioning systems and remote sensing devices to measure highly localized environmental conditions. Precision farming can also help to reduce agricultural waste and thus keep environmental pollution to a minimum. The major role for Nanotechnology-enabled devices is the use of autonomous nano sensors linked into the GPS system. The nano sensors can be distributed throughout the field where they can monitor soil conditions and crop. USA and Australia have already exploited this technology. Certain vineyards in California have installed WiFi technology with the help of the IT Company, Accenture. Although the initial cost of installing such a system is high but it is justified by the fact that it enables the best grapes to be grown which in turn produce finer wines, which command a premium price. The use of such wireless networks is of course not restricted to vineyards. Small nano sensors are being used by Honeywell (an R&D company) to monitor grocery stores in Minnesota. This technology enables shopkeepers to identify food items which have passed their expiry date and also reminds them to issue a new purchase order. Ultimately, precision farming, with the help of smart sensors, will allow enhanced productivity in agriculture by providing accurate information, thus helping farmers to make better decisions.

Strong Precise Delivery Systems

All over the world the agricultural production increased with increased use of chemical fertilizers and pesticides but it also brought with it the ill effects of the pesticides and chemicals in terms of disturbance of the ecological food chains and the land degradation. Many of the pesticides, including DDT were later found to be highly toxic, affecting human and animal health and as a result the entire ecosystem. Some of them such as Endosulfan have now been banned. Nanoscale devices are now used in agriculture. These devices are used to identify plant health before these become visible to the farmer. These devices will alert the farmer for timely remedial action. Such devices could also be used to deliver chemicals in a controlled and targeted manner.

Nanomedicines are now used to treat different diseases such as cancer in animals with high precision, and targeted delivery to specific tissues and organs. Encapsulation and controlled release of pesticides have revolutionized the use of pesticides and herbicides. Now many formulations are available which contain nanoparticles within the range of 100-250 mn. These are able to dissolve in water more effectively than existing ones thus increasing their activity. Nanoemulsions i.e emulsions of nano scale particles which can be either water or oil-based containing uniform suspensions of pesticidal or herbicidal nanoparticles of the size of 200-400 mn can be easily incorporated in various media such as gels, creams, liquids etc,

and have multiple applications for preventive measures, treatment or preservation of the harvested product. Syngenta is using Nanoemulsions in its pesticide products. One of its successful growth regulating products is the Primo MAXX plant growth regulator, which if applied prior to the onset of stress such as heat, drought, disease or traffic can strengthen the physical structure of turf grass, and allow it to withstand ongoing stresses throughout the growing season. Karate ZEON is another quick release product containing the active compound lambda-cyhalothrin and having a broad control spectrum on primary and secondary insect pests of cotton, rice, peanuts and soybeans.

Nanofood

Nanofood refers to the food made with Nanotechnological tools during cultivation, production, processing or packaging of the food materials. Nanotechnology is a boon for the food processing industry. The scope of Nanotechnology in food processing involves smart packaging, on demand preservatives and interactive foods. Nano capsules containing flavour or colour enhancers or added nutritional elements would remain dormant in the food and only be released when triggered by the consumer. The nutritional quality of food can also be enhanced through selected additives and improving the way the body digests and absorbs food.

Food Packaging and Processing

Nano particles are used to prolong the shelf life of many products by developing smart packages. Such packages are able to repair small holes, tears and respond to environmental changes of temperature, humidity and moisture. These packs alert the customer if the food is contaminated.

Companies have developed Nanosensors which are extremely sensitive to gases released by food as it spoils, causing the sensor strip to change colour as a result, giving a clear visible signal of whether the food is fresh or not. EU researchers have developed biochips which detect pathogens in the meat and fish products. Now Nanocapsules have been developed that are incorporated into food to deliver nutrients and for increased absorption of nutrients. Nanocapsules containing tuna fish oil which is a source of omega 3 fatty acids are incorporated in bread in Australia. These are designed to break open only when they have reached the stomach, thus avoiding the unpleasant taste of the fish oil.

Conclusion

Although many countries have realized the importance of Nanotechnology in agricultural sector but it has not been exploited to its fullest potential. The Punjab Agricultural University in Ludhiana was allocated US$22.6 million in 2006 for research on exploiting Nanotechnology in agriculture. A high level task force has also been set up by Prime Minister to study the prospects of Nanotechnology in a country like India. Whatever be the impact of Nanotechnology on agriculture the safety of food will be of prime concern. Application of Nanotechnological tools to agriculture is at its nascent stage, and its success will be based on its ultimate acceptance by the stakeholders. At the same time an effective regulatory mechanism and strong governance system should be put in place. Equal importance needs to be given to the societal issues associated with Nanotechnology otherwise it will turn out to be another Genetically Modified Organisms (GMO) like controversy.

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Banana Production in India

By **Gaurav Kumar Singh***

Banana is one of the most important fruit crops grown in India. In respect of area, it ranks second and first in production only after mango. India leads the world in banana production with an annual output of about 16.820 mt.

Varieties

Dwarf Cavendish (AAA): It is a popular commercial cultivar grown extensively for table and processing purpose in the states of Maharashtra, Gujarat, Bihar and West Bengal. It is also popular in Tamil Nadu, Karnataka and Andhra Pradesh. 'Basrai' is the leading commercial variety of Cavendish group and is a leading commercial variety of Maharashtra. The plant stature is Dwarf making it less prone to wind damage. The average bunch weight with 6-7 hands and with about 13 fruits per hand is about 15-25 kg. The thick rind of the fruits retains to some extent the greenish colour even when the fruits are ripe. Gandevi selection known as 'Hanuman' or 'Padarre' is gaining importance. The selection yields bunches weighing 55-60 kg. In combination with high-density planting and drip irrigation, Dwarf Cavendish is becoming a highly successful cultivar. It is highly susceptible to Sigatoka leaf spot disease in humid tropics restricting its commercial cultivation.

Robusta (AAA): It is a semi-tall variety, grown mostly in Tamil Nadu and some parts of Karnataka for table purpose. It is high yielding and produces bunch of large size with well developed fruits. Dark green fruits turn bright yellow upon ripening depending on ripening conditions. Fruit is very sweet with a good aroma. Bunch weighs about 25-30 kg. Fruit has a poor keeping quality leading to a quick breakdown of pulp after ripening. Hence, it is not suited for long distance transportation. Robusta is highly susceptible to Sigatoka leaf spot disease in humid tropics.

Rasthali (Silk AAB): It is a medium to tall variety commercially grown in Tamil Nadu, Andhra Pradesh, Kerala, Karnataka and Bihar. Its unique fruit quality has made Rasthali popular and a highly prized cultivar for table purpose. Fruits are yellowish green throughout their development, but turn pale yellow to golden yellow after ripening. Fruit is very tasty with a good aroma. Longer crop duration, severe susceptibility to Fusarium wilt, requirement of bunch cover to protect fruits from sun cracking and formation of hard lumps in fruits make crop production more expensive.

Poovan (Mysore AAB): It is a leading commercial cultivar grown throughout the country with location specific ecotypes like palayankodan in Kerala, Poovan in Tamil Nadu, Karpura Chakkarakeli in Andhra Pradesh and Alpan in North Eastern Region. It is generally cultivated as a perennial crop. Tamil Nadu is the leading producer of Poovan cultivar

owing to its climatic and marginal soil condition. Poovan is also commercially cultivated for leaf industry throughout Tamil Nadu and in certain parts of Kerala. Fruit is slightly acidic, firm and has typical sour-sweet aroma. Fruits turn to attractive golden yellow on ripening. It is highly susceptible to Banana Bract Mosaic Viral (BBMV) disease and Banana Streak Virus, (BSV), which cause considerable reduction in yield.

Nendran (AAB): It is a popular variety in Kerala where it is relished as a fruit as well as used for processing. Commercial cultivation of Nendran has picked up rapidly in Tamil Nadu in the recent past. Nendran is known to display considerable diversity in plant stature, pseudostem colour, presence or absence of male axis, bunch size, etc. Bunch has 5-6 hands weighing about 12-15 kg. Fruits have a distinct neck with thick green skin turning buff yellow on ripening. Fruits remain starchy even on ripening. Nendran is highly susceptible to Banana Bract Mosaic Virus (BBMV), nematodes and borers.

Red Banana (AAA): Red banana is the most relished and highly prized variety of Kerala and Tamil Nadu. Its commercial cultivation is prominent in Kanyakumari and Tirunelveli districts of Tamil Nadu. It is also popular in Karnataka, Andhra Pradesh and to some extent in Western and Central India. In Bihar and other regions, it is popular as Lal Velchi and Chandra Bale in Karnataka. The colour of the pseudostem, petiole, midrib and fruit rind is purplish red. It is a robust plant with bunches weighing 20-30 kg under good management practice. Fruits are sweet, orange yellow coloured and a pleasant aroma. It is highly susceptible to bunchy top, fusarium wilt and nematodes.

Ney Poovan (AB): Ney Poovan is the choicest diploid cultivar, which is under commercial mono cultivation on a large scale especially in Karnataka and Tamil Nadu. In Kerala It is grown in backyards and now shifting to large-scale cultivation. Ney Poovan is a slender plant bearing bunches of 15-30 kg after 12-14 months. Dark green fruits turn golden yellow with a very good keeping quality. Fruit is highly fragrant, tasty, powdery and firm. Ney Poovan is tolerant to leaf spot but susceptible to Fusarium wilt and banana bract mosaic virus.

Virupakashi (AAB): It is an elite variety in South India especially grown for table purpose in Palani and Shevroy hills of Tamil Nadu under perennial cultivation. Fruits show a typical curvature, possess a pleasant aroma and delightful taste. Virupakshi has the characteristic flavour only when they are cultivated in higher elevation. In the mixed cultivation it is well suited as a shade plant for young coffee. It has many ecotypes like 'Sirumalai' (grown on hills), 'Vannan', 'Kali' etc. well suited for cultivation in plains. Perennial system of cultivation aggravates Banana Bunchy Top Virus (BBTV).

Pachanadan (AAB): It is a popular variety in Tamil Nadu grown especially for its cooling effects in hot tracts in summer. The variety comes up well in marginal soils without any yield reduction. It is well suited as an intercrop in coconut/ arecanut garden. The bunch weight ranges from 12-15 kg (after 11-12 months). Pachanadan could be used in the Nendran plantations for gap filling as it comes up for harvest along with Nendran. This variety is tolerant to leaf spot and Banana Bunchy Top Virus (BBTV) diseases, but susceptible to wilt disease.

Monthan (ABB): It is a widely cultivated variety for processing. Monthan is a fairly tall and robust plant bearing bunches of 18-20 kg after 12 months. Fruits are bold, stocky, knobbed and pale green in colour. The skin is usually green. The new type of 'Monthan' namely 'Kanchi Vazhai'

and 'Chakkia' are recently becoming popular in Tamil Nadu. Apart from its culinary use as a fruit, pseudostem core is a highly relished vegetable with many medicinal properties. Monthan is also cultivated for production of leaves in Trichy and Tanjore districts of Tamil Nadu. It has many desirable qualities like immunity to Banana Bunchy Top Virus (BBTV) diseases, salt tolerance and normal bunch mass even under marginal condition, but it is highly susceptible to Fusarium wilt disease.

Karpuravalli (ABB): It is a popular variety grown for table purpose in medium rich soils. Its commercial cultivation is spread over in Central and Southern districts of Tamil Nadu and Kerala. In Bihar, cultivation is in patches under the name 'Kanthali'. Karpuravalli is a tall, robust plant well suited to marginal lands and soils and produced under low input conditions. It is also the sweetest among Indian bananas. Karpuravalli is occasionally seeded depending on the seasonal variability. Karpuravalli is highly susceptible to wilt disease, tolerant to leaf spot disease and well suited for drought, salt affected areas and low input conditions.

Safed Velchi Musa (AB Group): This is considered a good quality fruit for table purpose and is cultivated in Thane and Nasik districts of Maharashtra. It is grown under the shade of arecanut gardens in the South Kanara districts of Karanataka. This variety is medium sized with slender yellowish green pseudostem and can be recognised by the reddish petiole margin, large fruits, very thin and papery rind and white firm flesh that is very sweet. The average bunch weight is about 12 kg and has about 150 fruits/bunch. The duration of the variety is about 13 months.

Propagation

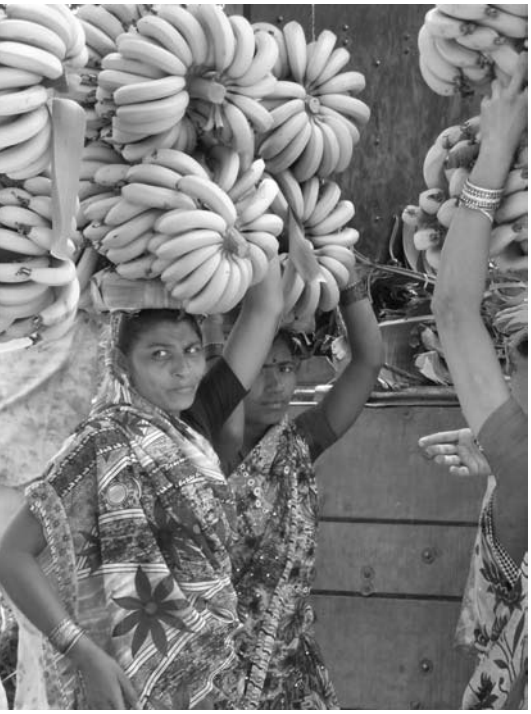
Vegetative Method: Commercial bananas are seedless and propagated exclusively by vegetative means. The banana has a reduced underground stem, called the rhizome, which bears several buds. Each of these buds sprouts and forms its own pseudostem and a new bulbous rhizome. These daughter plants are called suckers. Banana is mostly propagated by rhizomes and suckers viz. sword suckers and water suckers. Sword suckers have a well developed base with narrow sword-shaped leaf blades at the early stages. Suckers of 2-4 months age are selected. Other planting materials are whole or bits of rhizomes. Basrai variety in Jalgaon (Maharashtra) is propagated by dormant rhizomes. After cutting the parent plant, the rhizomes are removed from the soil, stored in cool, dry place for about 2 months. During the resting period the remaining part of pseudostem at the bottom falls off, leaving prominent heart bud. Conical rhizome should be selected while flat rhizomes should be rejected. The weight of the rhizomes should be 500g-750g. Very small rhizomes will give bigger size fruits with late flowering while bigger size rhizomes flower early but bear small size fruit bunches. Since banana is highly unstable in genetic constitution, the suckers/rhizomes should be selected from plants, which are healthy, having all the desirable bunch qualities and high yielding ability.

Tissue Culture: Banana plants are also propagated through tissue culture. Varieties like Shrimanti, Gross Michael and Grand Naine are commonly produced using tissue culture technique. Plants are initially kept in shade (50%) and as they harden, shade is reduced gradually. After six weeks, plants do not require any shade.

Pits of size 45cm x 45cm x 45cm are dug at the recommended spacing. Polybag may be slit and removed and the plant is inserted into the centre of the filled pit without disturbing the roots. The soil level must be maintained at the same level as in the polybag.

Methods of Planting

Pit Method: Pits of 0.5m x 0.5m x 0.5m are dug for planting the rhizomes. However this method is very laborious and expensive. The only advantage is that



no 'earthing up' is required as planting is done at the required depth. This practice is not very popular at present.

Furrow Method: This is a very common method in which furrows of 20-25cm depth are opened by a tractor or ridger at a distance of 1.5m and rhizomes are planted in the furrows. In this method 'earthing up' needs to be done frequently in order to cover the exposed rhizomes.

Intercultural Operations

Weed Control: Regular weeding is important during the first four months. Spading is commonly used and normally four spadings a year are effective in controlling weeds. Integrated weed management by including cover crops, judicious use of herbicides, intercropping and hand weeding wherever necessary will contribute to increased production.

Temporary sheds should be erected near banana fields and all operations such as cutting into hands and application of fungicidal paste should be carried out under the shade

Pre-emergence application of Diuron (1kg a.i./ha) or Glyphosate (2 kg a.i./ha) is effective in controlling grasses and broad-leaved weeds without affecting the yield and quality of banana. Double cropping of cowpea is equally effective in suppressing the weed growth.

Intercropping: Intercropping can easily be raised in banana plantations at the early stages of growth. Vegetable and flower crops like radishes, cauliflower, cabbage, spinach, chilli, brinjal, lady's finger, gourds, marigold and tuberose can be successfully grown as intercrop. Mixed cropping with arecanut coconut and cassava is a common and widely adopted practice in South India.

Desuckering: Banana produces a number of suckers from the underground stem. If all these suckers are allowed to grow, they grow at the expense of the growth of the main plant and hence, the growth of the sucker should be discouraged. Removal of unwanted suckers is one of the most critical operations in banana cultivation and is known as desuckering. Such suckers are removed either by cutting them off or the heart may be destroyed without detaching the sucker from the parent plant.

Earthing Up: In case of furrow planting, 'earthing up' should be done during rainy season to avoid water logging. During winter and summer the plant should be in the furrow.

Propping: Propping operation is carried out in areas with high wind speeds. Pseudostems are propped up with bamboo, especially, at the time of bunch emergence.

Leaf Removal: Pruning of surplus leaves helps to reduce disease from spreading through old leaves. Pruning of leaves before bunch initiation delays flowering and harvesting cycle. For maximum yields a minimum of 12 leaves are to be retained.

Bunch Covering: Bagging (bunch covering) is a cultural technique used by planters where export quality bananas are grown. This practice protects bunches against cold, sun scorching, attack of thrips and scarring beetle. It also improves certain visual qualities of the fruits. Bunch covering with dry leaves is a common practice in India.

Removal of Male Flower Bud: Removal of male bud after completion of female phase is necessary. Once the process of fruit setting is over, the inflorescence rachis should be cut beyond the last hand otherwise it grows at the cost of fruit development. This helps in early maturity of the bunch.

Harvesting: Irrigation of banana plantations should be stopped well in advance of the harvest date, preferably a week, so as to facilitate drying of the soil for movement of labour, harvesting, loading, etc. Temporary sheds should be erected near banana fields and all operations such as cutting into hands and application of fungicidal paste should be carried out under the shade. Bunches selected should be green, three-fourths ripe, whole, free from rubbing, scratching, bruises, sunburns or other blemishes. Bunches having malformed fingers, octopus-shaped hands, broken, torn or split fingers etc. should be rejected. Three quarters full stage is recognized by sharp angularities of the fingers. In some banana growing countries, the bunches are marked with date and month as soon as the inflorescence is shot. Under irrigated conditions the variety 'Dwarf Cavendish' takes 99-107 days to reach three quarters full maturity. 'Dwarf Cavendish' banana at three-fourths full maturity shows a pulp skin ratio of 1.35 to 1.40 under normal conditions and this gives a fairly accurate index of maturity. One cutter and one helper are required for cutting (harvesting) the bunches. The bunch should be cut in one stroke 20 cm to 25 cm above the first band or 7.5 cm to 10 cm from the tip of the fingers of the first hand. The helper should hold the same portion and place it carefully on the freshly cut leaves spread on the ground. The last hand is removed if undersized. Bunches should be carried to packing sheds after 15 minutes of harvest, when the latex flow ceases. The bunches should be taken two at a time on stretchers and should not be allowed to come in contact with soil.

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Importance of Management Education in Agriculture Sector

By **Sharvari Patil** *

India is an agrarian economy and agriculture is considered to be the backbone of our economy. In India, agriculture has been practiced since ancient times, when other developmental sectors were not even in existence and farming was mostly treated as a life sustaining activity. India, the country which was a net importer of food grains in the early 60s, has become an intermittent exporter of various agricultural commodities. Today, agricultural sector has achieved commercial importance and has tremendous potential of being one of the powerful sectors contributing to the nation's GDP. Besides the government's special emphasis on privatization, public private partnership, farmer organizations too have contributed to the agricultural growth. Over and above, education plays a prime role in achieving development in any sector. Currently, agribusiness education is one of the promising qualifications.

Conventional Education in Agriculture

In India, education in agriculture started in early nineteenth century and today its research and training sectors are globally recognized for their quality. The graduation course in agriculture includes subjects such as entomology, animal husbandry, engineering, statistics, biotechnology, and many more which helps students in widening their sectoral knowledge. Apart from these, government as well as various private bodies offer informative training programmes in diverse areas which are specially designed for farmers as well as for entrepreneurs.

Students willing to go for a post graduate degree can enrol either for M.Sc. or for agri-business management course. The M.Sc. Programme is designed to provide technical and analytical knowledge.

Agri-Business Education

In the Agriculture education system, management is of very recent origin and is gaining rapid popularity among students.

Agribusiness management is a two year course with a semester pattern system. The course itself starts from basic fundamentals like introduction to management, managerial effectiveness, business communication, business economics, quantitative techniques, basic accounting, information systems etc. These help students to be familiar with fundamental concepts of any business. Along with all these subjects, the agri-business course also comprises of various technical subjects like post harvest management, farm mechanization, management in agricultural, allied food processing industries, management of cooperatives, etc. The course program offers elective specializations in marketing, human resource management, finance, international business management, information systems which cover the overall business activities. In addition to these, many institutes arrange industry visits; organize guest lectures, management games, business quizzes, CSR activities, personality development workshops as a part of extra-curricular and co-curricular activities.

In addition to theoretical and practical knowledge, the curriculums also help students in inculcating managerial skills, soft skills and boosting confidence levels which is considered as one of the most crucial part in personality development.

Currently, some of the premier institutes providing post graduate courses in agribusiness management are MANAGE (Hyderabad), NIAM (Jaipur), IRMA (Gujarat), and IIM (Ahmedabad). Besides these, there are several government, semi-government and private institutes providing the course on full time and correspondence basis. Additionally, various private and government bodies offer entrepreneurship training programs to undergraduate students through agri-clinics and agri-business training centres step for encouraging entrepreneurship in India.

Need, Importance and Scope of Agribusiness Management Education

Agriculture has achieved satisfactory growth in the last few decades, but presently due to various national and international factors, the growth is relatively stagnant. Upgradation is needed right from harvesting the agricultural produce till it reaches the consumers. The majority of the farmers and small entrepreneurs are not well-versed about standard practices required during pre-harvest as well as post-harvest operations, which undoubtedly plays a vital role in overall productivity. On the other hand, too many middlemen in the marketing channel are a major cause of concern. As a result of this, the farmer, who is the key performer in farming, is not getting adequate returns to his produce. Consequently, overall distortion in the marketing channels and high price of final produce adversely affect cost competitiveness. In addition to these, a growing global population has resulted in disparity between market demand and supply of agricultural produce. Thus, special consideration is required on following proper management practices, reducing raw material wastages at farm and processing level, effective marketing strategies like advertising, brand positioning at national and international level etc. Finally, proper management of all agribusiness activities right from planting the seed to getting the actual reward in the marketplace is required. These issues are expected to be addressed by education in the agricultural sector, which certainly has the potential of creating a second wave in agricultural revolution.

Agribusiness education gives an option of joining the agricultural corporate sector. The corporate sectors involved in production and distribution of pesticides, fertilizers, seeds, farm equipments are some of the usual options available

After completing agribusiness management education, students become well versed with various management applications. The curriculum is a combination of management and technical subjects. Specializations in marketing, human resource management, finance, and international business management certainly help them to grow in the industry successfully. Marketing deals with implementing innovative selling and advertising strategies so as to sustain business operations and solve financial problems. Human resource management educates them how to retain and utilize manpower effectively. International business management helps in growing the business globally. The content gives deep knowledge about the subject. Practical knowledge gained through case studies helps in solving various business matters effectively. The students also undergo summer training for two months in respective industries.

Potential in Agri-business Education

In India, about 60 percent of the population is directly or indirectly dependent on agriculture to earn a living. But after analyzing the employment scenario of the sector, it is observed that most of the students after completing education in agriculture ignore their own farmland and join private companies or other institutions. There is a need to divert manpower to rural areas and manage agricultural land effectively.

Agribusiness education gives an option of joining the agricultural corporate sector. The corporate sectors involved in production and distribution of pesticides, fertilizers, seeds, farm equipments are some of the usual options available. Currently, there are excellent job opportunities in the food processing sector. It is a wide area involving fruits, vegetables, fishery, meat & poultry, dairy, apiculture, sericulture sector etc. The other blooming sectors which have tremendous growth opportunities are organic farming, bio-fertiliser industry, retail sector, agri-banking, biofuel sector, FMCGs etc. Another option can be transforming their own farmland into a profitable venture by applying managerial skills and knowledge. To shape the Indian agriculture into a commercially viable entity, there is a vital need to inculcate the spirit of entrepreneurship.

Agri-business management has wide scope in developing trained manpower in different areas of operation viz. management personnel in cooperatives and agriculture industry, policy makers for overall financial sector, trained teaching staff, technically sound team in research etc. Apart from this, agriculture consultancy, journalism, agri-banking, hi-tech farming, agriculture conservation, agriculture engineering are also potential career options.

SOURCE: Mrs. Sharvari Patil, Asst. Professor, MITCON, Institute of Management Balewadi, Pune, Maharashtra.

Micro Insurance in India **An Overview**

By **Dr. Rais Ahmed and Mohd.* and Arshad Khan****

Over the last few years, 'people participation' and 'empowerment' have become the buzzwords in the rural development and local planning. In this context microfinance has emerged as the most successful strategy. Microfinance in itself has proved to be one of the remarkable phenomena in developing the socio-economic environment of the poor. Generally it is thought that poor are not bankable because of uncertainty about their repayment capacity and their inability to provide collateral. Also, it is generally perceived that the rural poor borrow for consumption smoothening rather than investment purposes.

Micro-insurance can play a positive role in meeting the financial needs of the poor. Micro-insurance is defined as insurance accessed by low income people, provided by a variety of institutions, run in accordance with generally accepted insurance principles, and funded by premiums - (IAIS 2007). In India, around 70 percent of the healthcare expenditure is borne by households. Direct out-of-pocket payments could push 2.2 percent of all healthcare users and one-fourth of all hospitalized patients, into poverty in a year. Although these percentages may seem small, they translate into substantial numbers considering India's huge population. These estimates do not take into account sick persons who do not seek treatment. According to the NSSO data 55th Round, households spend about 5–6 percent of their total consumption expenditure on health, which is 11 percent of all non-food consumption expenditure. Thus micro-insurance, potentially, is one of the basic institutions which can provide a defence against social and financial exclusion for people whose existing coping strategies are failing.

In this article, we analyse the evidence on micro-insurance already available in the country, highlight the current initiatives being contemplated to strengthen micro-insurance and suggest specific ways that can help promote insurance to the target segment.

The Demand for and Supply of Micro-insurance

The UNDP study estimates the potential market size for the micro-insurance in India to be between Rs 62000 and Rs 84000 million. The potential for life insurance is estimated to range from Rs 15393 to 20141 million. The population used for this estimation is 40-50 percent of the potentially economically active and earning less than US$1 a day. (Parmashivaiah P. and Gundupagi Manjunath, 2010). This shows that market for micro-insurance is enormous and remains untapped. Also the market will grow as micro-insurance is better understood and the demand will also grow with appropriate supply. If given the proper policy environment, innovative products and simple procedures India's micro-insurance industry is going for rapid growth in the coming days.

As per the IRDA statistics, today there are 24 general insurance companies including the ECGC (Export Credit Guarantee Corporation of India Limited) and Agriculture Insurance Corporation of India and 23 life insurance companies operating in the country. IRDA notified the micro-insurance regulations in 2005 to facilitate the insurance companies to sharpen their focus on poor and vulnerable people.

Demand for Micro-Insurance

During the 1990's a large number of low premium insurance schemes emerged, covering people against death, accidents, natural calamities and loss of assets due to fire, theft and so on. Livestock and assets insurance was extended along with subsidized IRDP loans and thus remained scheme-driven, with little

awareness among clients (FisherThomas and M.S. Sriram, 2008). Crop insurance does not squarely fall into the micro-insurance category. But a large proportion of Indian population is still dependent upon the agriculture which is exposed to risk arising from unpredictable weather conditions. Similarly, studies suggested that around 100 million rural households in India depend upon their livestock for their livelihood. But less than 10 percent of cattle are insured due to factors like problem with distribution channels, literacy and awareness etc. Thus there is significant unmet demand for micro-insurance services for crop insurance and cattle insurance.

The overall industry in India is still at a rudimentary stage of development. Only 10 percent of India's population possesses some form of coverage. Of the total global insurance premium estimated at US$3,426 billion, India's share accounted for an abysmal 0.73 percent in 2005. Table 1 below illustrates the lack of insurance coverage in India and other South Asian countries (Rajivan Anuradha, 2008). With the rapid growth trajectory in recent years, India has achieved an insurance density of US$46.6 (144% over 2003) and an insurance penetration of 4.7 percent (36% over 2003) in 2008. However, 90 percent of the Indian population, and 88 percent of the Indian workforce (the majority of unorganized workforce) are still excluded from any kind of insurance cover and pension cover respectively (Mukherjee Premasis 2010).

Table: 1

Population Excluded from Insurance in South Asian Countries		
Countries	**Excluded Population**	
	%	Million
India	90	950
Bangladesh	93	134
Pakistan	97	147
Nepal	95	23

Source: Anuradha Rajivan, Microinsurane In India, P-18, Yojana january 2008, VOl 52

A study conducted by National Council for Applied Economic Research (NCAER) in 2008 found that while 78 percent of surveyed sample of 3,15,000 were aware of life insurance, only 24 percent had actually taken insurance. Most insurance holders were male (86% of life insurance holders) (NCAER, 2008).

Supply of Micro-Insurance

A report published by ILO (International Labour Organization) in 2005 provided an inventory of 83 micro-insurance products in India, including life disability, accidental death, healthcare, asset protection and accidental expense. A single product is offered by 46 schemes, while 37 schemes offer two or more products. Life Insurance Company of India (LIC) has Janashree Bima Yojana (JBY), which provides Rs. 20,000 ($440) life insurance and Rs. 50,000 ($1100) accidental death insurance for Rs. 200 ($4.40) a year, subsidized up to 50 percent by the Government. Four public non-life insurers offer the Universal Health Scheme covering up to Rs. 30,000 ($660) of hospital expense for annual premium of Rs. 365 for a single person, Rs. 547.50 for a family of 5, and Rs. 790 for a family of seven. Persons below the poverty line receive a subsidy of Rs. 200 for an individual, Rs. 300 for a family of 5, and Rs. 400 for a family of seven.

These, along with the other government insurance products, may be helpful in extending coverage to the population neglected so far. However, the prevalence of public subsidies may strain the efforts of private insurers in expanding coverage to the BPL (Below Poverty Line) population. In addition, the product design of these subsidised schemes may not be particularly suited to the sector's need as the contract is complicated, with many exclusions.

Micro-Insurance Current Scenario in India

The Micro-insurance portfolio has made steady progress in the year under 2008-09 as shown in the Table 2. More life insurers have commenced their micro-insurance operations and many new products have been launched during the year. The distribution infrastructure has also been considerably strengthened and the new business has shown a decent growth, though the volumes are still small (IRDA 2009).

Individual			Group		
Insurer	**Policies**	**Premium**	**Schemes**	**Lives covered**	**Premium***
LIC	15,41,218	3,118.74	6,883	1,10,52,815	17,268.54
Private	6,10,851	537.81	14	14,98,994	3,326.80
Total	21,52,069	3,656.55	6,897	1,25,51,809	20,595.34

* Premium in Rs. Lakh

Note: New business premium includes first year premium and single premium.

Source: Annual Report 2008-09, IRDA

Micro-insurance business was procured largely under group portfolio. While the individuals procured new business in the year of Rs.36.57 crore under 21.52 lakh policies, the group business amounted to Rs.205.95 crore under 1.26 crore lives. LIC contributed most of the business procured in this portfolio by garnering Rs.31.19 crore of individual premium from 15.41 lakh lives and Rs.172.69 crore of group premium under 1.11 crore lives (IRDA 2009). MFIs (micro finance institutions) are the most popular distribution channel for micro covers.

The central Government has initiated steps to facilitate better access by the poor, especially in rural areas. It has passed the Common Minimum Programme, according to which the Government shall extend "social security, health insurance and other schemes for such workers like weavers, handloom workers, fishermen/women, leather workers, plantation labour, beedi workers, etc". In order to meet these commitments, a National Commission on the unorganized sector was set up and given the task of making recommendations on social security. The central Government has decided to extend statutory social security cover, Employees Social Insurance (ESI) and Employees Provident Fund (EPF), which hitherto only applied to workers in the formal economy in enterprises located in large cities and to towns with a population of more than 10,000, and is

planning to extend the coverage to establishments with five employees. As social protection is a concurrent subject, states are free to pass their own social security laws and pursue their own social security projects as long as they do not contradict existing central government laws.

Creating A Conducive Environment for the Growth of Micro-Insurance

A unique challenge that the micro-insurance movement has to confront is the rather complex task involved in designing and distributing a diverse range of insurance products where knowledge and technical expertise is required from several fields like health care systems, animal husbandry, enterprise valuation, agriculture etc. This calls for a more collaborative approach in actual delivery of micro-insurance products, where expertise from insurers, distributors and service providers needs to be synchronised to achieve a seamless delivery of micro-insurance products. The complexity involved in micro-insurance is quite evident from the relatively slow introduction and growth of micro insurance among practitioners of micro credit. There is certainly a strong case for greater investments into capacity building for potential micro insurance distributors and collaborative partnerships for scaling up of micro insurance.

IRDA introduced the micro-insurance regulations in December 2005. The regulations enable SHGs, societies and co-operatives to function as micro-insurance agents and carry out a lot of functions like premium collection, policy bond distribution, claims etc. (Gunaranjan Sai 2007). This act ensures that all insurance companies in India develop and distribute products for the poor and rural people. Provisions have to be made for these companies to be recognized as micro-insurance agents.

One of the difficulties in the implementation of micro-insurance scheme is that the poor have a lower understanding of risk pooling and are often reluctant to join schemes where payments have to be made with no immediate returns (RBI 2008).

It can be said that IRDA has already taken a number of initiatives in order to further develop the market and improve the density of insurance penetration. Similarly, it has asked the insurance companies to devise new covers and products addressed to specific sectors in the economically weak population. It has been encouraging awareness campaigns to improve insurance literacy levels by conducting workshops, distributing literature etc. Similarly IRDA has entered into a Memorandum of Understanding (MOU) with the Indian Institute of Management, Bangalore, for carrying out research work in the case of insurance (Centre for Insurance Research and Education). The Agency is also working to provide efficient customer services as well as ensure greater penetration of health insurance in the country. IRDA introduced for the first time the institution of insurance broker which is expected to improve market penetration by enabling, designing and marketing of customised policies based on global best practices and experience. It will also enhance the efficiency in the conduct of insurance business with the scaling down of transaction costs.

The following areas must be looked further in order to enhance the growth of micro-insurance in India.

Regulation and Governance: Standard regulations may be unsuitable for micro-insurance in India. The smaller institutions could bring in cost-effective distribution and service models that might be difficult for mainstream institutions. IRDA needs to rethink the entry norms and facilitate the entry of niche micro-insurers for the benefit of small clients. As for mutual insurance schemes, there has been no specific regulation. Considering some of the numbers that are under mutual schemes, IRDA should examine the best manner of keeping track of such schemes and ensure orderly conduct. With IRDA playing a more development-oriented role, the micro-insurance market is set to expand over the next few years.

Simple Procedures: Unsuitable, complicated and costly procedures can lower service quality and increase operating costs. Because of all this a large section of potential customers keep itself away from the micro-insurance products. All this stops the market from developing to its full potential. So the need is to simplify the procedures, and to reduce the time in claim settlements.

Product Design: Standardised products do not tend to respond to clients needs which differs from region to region, person to person etc. These products are generally costly, which prevents low income households from purchasing them. Interaction with customers and potential customers for designing insurance products would lead to a greater product fit with client requirements. Offering micro-insurance products as separate unbundled products could provide broader choice and stimulate enrolment. There are high dropout rates in many schemes as members do not get the benefits they need. The mainstream insurers have to go down market and work on customizing insurance products.

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Plastic Low Tunnel Technology for Off-Season Cultivation of Cucurbits

By **Rupesh Lawwa and Balraj Singh ***

Vegetable growers often try to send their produce to the market early in the season and also try to extend the growing season for selected vegetable crops with the aim of obtaining marketing advantage and for getting higher prices on their off-season produce. For example – long melon, round melon, bottle gourd, bitter gourd, muskmelon, summer squash etc. If grown in early spring or summer, they command a greater price in the market.

Presently, river bed cultivation is practiced for production of cucurbitaceous vegetables during the off-season in northern parts of our country. Important factors that are considered for off season cultivation are: increased costs of using season extender production systems; potential increase in sale prices of the crop if produced either earlier or later; and, suitability of the crop to season extender production systems.

The use of plastic low tunnels for off-season melons and summer squash production is a common practice in Israel for export of the produce to European countries.

Row covers or low tunnels are flexible transparent coverings that are installed over the rows or individual beds of transplanted vegetables to enhance plant growth by warming the air around the plants in the open field during the winter season. They can also warm the soil and protect the plants from hailstorm, cold wind and injury, and advance the crop by 30 to 40 days in the normal season. This low cost technology for off season cultivation of cucurbits is suitable and may be quite cost effective for the growers in northern parts of the country, where the night temperature during winter season goes below 8 degrees centigrade for a period of 30-40 days.

The major steps involved in this technology are as under:

Nursery Raising for Off-Season Cultivation of Cucurbits: Seedlings of the desired cucurbits are raised in the nursery greenhouse in plastic pro-trays with 1.5 inches cell size in 'soil-less' media during December/January. Twenty-eight to thirty-two (28-32) day old seedlings at the 'four leaf stage' are transplanted under row covers or plastic low tunnels in the open field from mid-January to mid-February, when the night temperature is very low in northern parts of the country. Nursery of these crops can be also be raised even in polythene bags under very simple and low cost protected structures like walk-in tunnels or in locally available plastic trays in 'soil-less' media as per the need of the area. Crops like summer squash can be transplanted even in the month of December for complete off-season production and the crop is made ready for harvesting in the first week of February.

Preparation of Beds, Fixing of Hoops, Transplanting of Seedlings and Covering of Plastic: Transplanting of the seedlings is done in a single row on each bed at a planting distance of 50 cm on the drip system of irrigation. The distance between the rows is usually kept from 1.5 to 1.6 metres. Before transplanting of the seedlings on beds, flexible galvanized iron hoops are fixed manually at a distance of 1.5 to 2.5 m. The width of two ends of the hoop is kept to 40-60 cm with a height of 40-60 cm above the levels of the beds for covering the plastic on the rows or beds for making low tunnels. Transparent, 30 micron, IR grade plastic is generally used for making low tunnels, which

reflects infra-red radiation to keep the temperature of the low tunnels higher than the outside field. Currently, the introduction of biodegradable plastic for making low tunnels and for mulching purposes is eco-friendly and a source of sustainable technology in the production of off season vegetables. The plastic is usually covered in the afternoon after transplanting the desired vegetable. The plastic can be vented during the growing season as the temperature increases within the tunnels. Generally, 3-4 cm size vents are made on the eastern side of the tunnels just below the top. Later on, the size of the vents can be increased by reducing the distance between two vents. Ultimately, the plastic is completely removed from the plants in the months of February and March.

Pollination under Plastic Low Tunnel Crops: Most of the cucurbits are monoecious and needs pollination, which is usually performed by honeybees (Apis melifera). When there is complete flowering, bees can work in tunnels easily through the vents, made on the plastic. For effective pollination one beehive, with 30,000-50,000 workers is sufficient for one-acre of area. For greater effectiveness, the beehive box is always kept on the northwest side of the field.

Fertigation and Plant Protection in Low Tunnel Muskmelon Crop: Fertilizers are applied through drip irrigation. During the first month (i.e. January or February) water can be applied at 4.0 m3/1000m2 at an interval of 6-7 days. Fertilizer solution of N: P: K (5:3:5) is applied at 80-100 ppm per cubic metre of water. During the second month, 4.0 m3 of water can be applied on duration of 4 days with fertilizer solution at 120-150 ppm/m3 of water. Thereafter, the fertilizer quantity is reduced to 20-30 ppm till the fruits are of lemon size. After that the quantity is again increased to 120-150 ppm per cubic meter of water. Before ripening of the fruits, the quantity of fertilizer solution is again reduced to 50-60 ppm for enhancing the quality of fruits in muskmelon. But in other cucurbits the quantity of fertigation is always in increasing order, starting from 50 ppm to 300 ppm till the peak fruiting period. The water and fertilizer requirement of crops usually depends on the growing season, crop variety and soil conditions. If required, systemic insecticide like confidor can be applied through drip irrigation water for control of insects at early stage of the crop when the crop is under plastic tunnels and no foliar spray is possible.

Harvesting and Crop Advancement: If the muskmelon crop has been transplanted in the first week of February, the fruits will be ready for harvesting in the third week of April. Crops like summer squash can be transplanted in the first week of December, which are made ready for harvesting in the first week of February, and can be treated as a complete off-season crop. Different cucurbits can be transplanted from the first week of December to the first week of February and can be advanced 30-60 days over their normal season of cultivation. Off-season fruits produced under low tunnels can fetch very high prices in the market. This technology is quite economical for growing off-season vegetables in semi-urban areas of the northern plains of the country.

SOURCE: Rupesh Lawwa and Balraj Singh, Centre for Protected Cultivation Technology, Indian Agricultural Research Institute, New Delhi-12

Agri-Informatics Prepares to Face Challenges in the Agricultural Domain

Agriculture is the backbone of Indian economy, providing livelihood to about 67 percent of the population and contributing approximately 35 percent to the Gross National Product. Keeping in view the rising population, the country requires 250 million tonnes of food grains. The situation urgently calls for efficient and sustainable agricultural practices. It requires both horizontal (bringing additional land under cultivation) and vertical approaches (improved crop management techniques). Horizontal development is not possible to a large extent. In fact, an ever-increasing population has resulted in diminishing of available cultivable landmass. Vertical approach includes generating reliable information in terms of suitability of available land, improving crop yield, better land use, optimal use of fertilizer, quality and disease-resistant seeds, seasonal crop acreage, and dissemination of information which requires the use of Agricultural and Meteorological Information, GIS, GPS and Satellite Remote Sensing in an integrated fashion.

Information and Communication Technology (ICT) can play a significant role in maintaining viable information as it consists of three main technologies – Computer Technology; Communication Technology; and, Information Management Technology. These technologies are applied for processing, exchanging and managing data, information and knowledge useful for agricultural information system. Thus, the potential of Information Technology (IT) can be assessed broadly under two heads: (a) As a tool for direct contribution to agricultural productivity; and (b) As an indirect tool for empowering farmers to take informed and quality decisions which will have positive impact on the way agriculture and allied activities are conducted.

When used as a broad tool for providing local farming communities with scientific knowledge, ICT heralds the formation of knowledge societies in rural areas of the developing world. However, this can only be realized when knowledge and information are effectively harvested for overall agricultural and rural development. The agricultural paradigm in the developing world will have to be recast to take advantage of knowledge availability to achieve multiple goals – of income, of food, of jobs, etc. ICT has a significant role to perform in evolving such a paradigm. The role of ICT to enhance food security and agricultural livelihoods are widely recognized and discussed the world over. This includes the

use of computers, internet, geographical information systems and mobile phones, as well as traditional media such as radio or TV. There are several e-governance initiatives in the country in the area of agriculture, fisheries, animal husbandry, dairy and allied sectors.

Agricultural extension activities, developing farming system, research and extension with location-specific modules, promoting market extension, sustainable agricultural development, participatory research, etc. are some of the numerous areas where ICT can play an important role.

The existing system of large jurisdictions, each with a narrow range of activities, is less effective. However, broad basing requires grassroots workers to be at the cutting edge of extension and master of many trades, which is not really achievable. ICT can help here, by enabling extension workers to gather, store, retrieve and disseminate a broad range of information needed by farmers, thus transforming them from extension workers into knowledge workers. The emergence of such knowledge workers will result in the realisation of the much talked about bottom-up, demand-driven technology generation, assessment, refinement and transfer. ICT helps the extension system in re-orienting itself towards the overall agricultural development of small production systems. With appropriate knowledge, small-scale producers can even have a competitive edge over larger operations.

Objective of the Course

- To impart conceptual, theoretical and applied knowledge of Information Technology, Management, Informatics and Agriculture;
- To impart sound knowledge in Science, Technology and Management related to Agriculture Information Systems and their applications in relevant fields with the latest technology and tools;
- To cater to the needs of industry, research, extension and scientific organizations in the global era in emerging field of Agri Informatics and related areas;
- Generating human resources with the right skills, knowledge, aptitude and leadership qualities for the effective design and implementation of ICT enabled agricultural production and extension services for the country;
- Conceptualization of ideas and development of various e-enabled agri-information services, systems and process for improving the agricultural production and marketing system; and,
- To broaden the scope of Agri e-extension services in the country.

Job Opportunities

There is a huge demand for agricultural graduates with techno-management skills. Several national and international agencies like FAO, USDA are looking for candidates with the right mix of technological and managerial skills to manage their activities. Major nationalized banks and financial institutions in the country recruit agricultural graduates with adequate technology skills. Many agro based industries focussing on precision farming and high-tech agriculture require ICT enabled knowledge and skills to manage such farms.

With respect to these needs, many IT applications are developed to provide better support and education to agricultural academia and farmers. Governments, NGOs, institutions and private organizations have started creating agriculture related sites for the Indian farmers. There is a huge demand for a graduate with knowledge of agricultural domain along with profound software knowledge.

The university prepares human resources in the field of Agriculture Information Technology (AIT) as a tool to sharpen the edges of the agriculture structure in the country. It takes the onus to develop and hone the sector and its changing environment.

Job Prospects

Job prospects are numerous. For example: IT Service Facility Manager; Weather/ Crop Forecasting Expert; e-Learning Specialist; Knowledge Management Expert; Commodity Trader; ERP systems Manager; Farm/Plantation Manager; e-Commerce Portal Manager; Financial Analyst; Supply Chain Manager; BPO Services Manager; Crop Insurance Manager; e-Governance Portal Designer.

Many agro based industries focussing on precision farming and high-tech agriculture require ICT enabled knowledge and skills to manage such farms

SOURCE: Research conducted by Shobhit University

Technological Gap in Adoption of Recommended Soybean Cultivation Practices and Its Correlates

By **Suranse*, P.K., Dr. P.O. Ingle and Dr. U. G. Thakare**

The majority of soybean growers (58.33%) had no technological gap in selection of soil for soybean cultivation (81.67%), sowing method (90.00%), seed rate/ha, spacing (98.33%), land preparation (66.67%), sowing time (100.00%), improved varieties (77.50%), doses of chemical fertilizer (64.17%), intercultural practices (54.16%), harvesting and threshing (100.00%). Majority of the respondents had complete technological gap in case of crop rotation (90.83%), seed treatment with bio-fertilizers (63.33%), seed treatment with fungicides (70.83%), Water management (86.67%) and disease control (87.50%). It is concluded that with the increased level in education, annual income, landholding, area under soybean, socio-economic status and information sources the technological gap of the respondents decreased. Landholding, area under soybean and social participation could contribute more to variation in technological gap in recommended soybean cultivation practices.

Introduction

It is always observed that there is a huge gap between the recommended crop production technologies and farmers' practice. All farmers do not adopt the recommended crop production technologies at the same sequence and at the same rate. Therefore, it is felt that there may be a wide gap between production potential and actual production. Hence the study was undertaken with the following specific objectives:

1. To study the extent of technological gap in soybean cultivation amongst soybean growers; and,
2. To study the relationship between selected personal, socio-economic, situational, psychological and communicational characteristics of soybean growers with technological gap.

Methodology

The present study was undertaken in Akola Panchayat Samiti, Akola district of Maharashtra State. An exploratory design of social research was used for the present study. The present study was undertaken on proportionate random sampling of 120 soybean growers in nine villages of Akola Panchayat Samiti.

The technological gap was operationally defined as the gap between practices of soybean cultivation as recommended by Dr. PDKV, Akola and actual adoption of these technologies by soybean growers. In view to calculate technological gap, practice-wise technologies recommended

for soybean cultivation were ascertained with the help of Dr. PDKV, Krishi Sanvadini (Krishi Dairy), Akola. There were 19 important items related to selected 7 recommended practices of soybean cultivation.

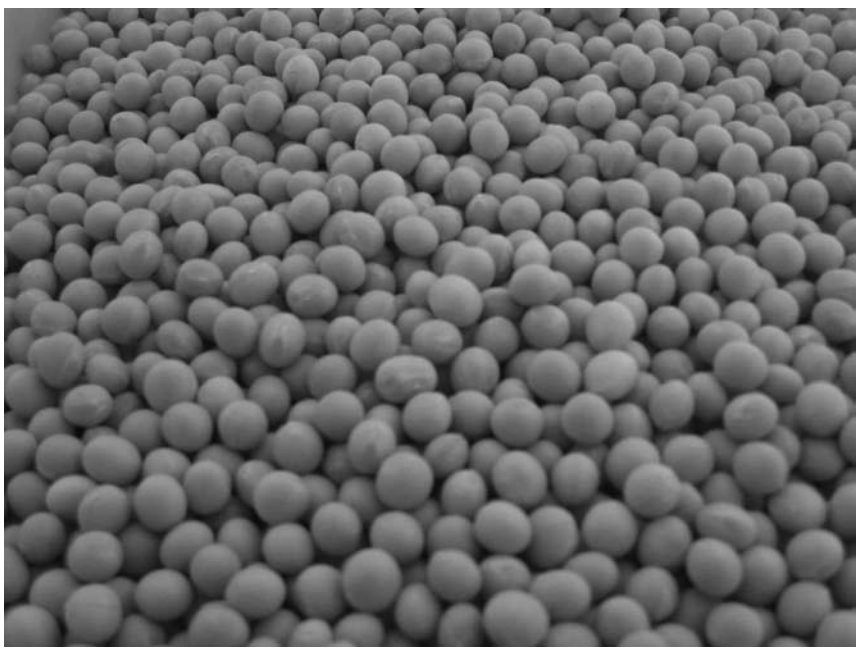
Responses of the respondents were collected on three point continuum viz., complete adoption, partial adoption and non-adoption with assigning score of 2, 1 and 0, respectively. On the basis of scores obtained for technologies adopted, the technological gap index for each practice was analysed.

Results and Discussion

Technological Gap: The respondents were grouped into three categories viz., low, medium and high technological gap as shown in Table 1.

Table 1: Distribution of Soybean Growers According to Technological Gap

No.	Technological Gap	Index Range	Frequency (N=120)	Percentage	Mean	S.D.
1	Low	Upto 33.33	50	41.67	34.35	09.45
2	Medium	33.34 to 66.66	70	58.33		
3	High	66.67 and above	0	0.00		



Relational Analysis: Efforts were made to analyse the characteristics of the soybean growers with their knowledge and technological gap in recommended soybean cultivation practices.

Age and Technological Gap: Age was found to be negatively and non-significantly correlated with technological gap. The probable reason for this may be that the majority of the growers follow similar types of cultivation practice.

Education and Technological Gap: Education was found to be highly significant and negatively correlated with technological gap. Higher education resulted in increased knowledge and reduced technological gap by adopting recommended technology. Similar findings were reported by Chapke (2000).

Annual Income and Technological Gap: Annual income of the respondents negatively and significantly correlated with technological gap. Respondents with a better economic standing have the capacity to invest more. Also their risk bearing capacity is more, resulting in adoption of recommended practices. This finding is in line with the findings of Jaiswal (2001).

Landholding and Technological Gap: Negative and significant relationship was observed between landholding and technological gap. The findings of the

Table 2: Distribution of Soybean Growers According To Practice Wise Extent of Technological Gap in Recommended Cultivation Practices

No.	Recommended Soybean Cultivation Practices	Technological Gap					
		No		Partial		Complete	
		Freq.	Percent	Freq.	Percent	Freq.	Percent
1	Preparatory tillage	63	52.50	54	45.00	3	2.50
	i) Type of soil	98	81.67	18	15.00	4	3.33
	ii) Preparation of land	80	66.67	40	33.33	0	0.00
	iii) FYM application	9	7.50	105	87.50	6	5.00
2.	Sowing method and sowing time	95	79.17	1	0.83	24	20.00
	i) Sowing method	108	90.00	0	0.00	12	10.00
	ii) Recommended sowing time	120	100.00	0	0.00	0	0.00
	iii) Recommended seed rate/ha	118	98.33	2	1.67	0	0.00
	iv) Spacing	118	98.33	2	1.67	0	0.00
	v) Suitable crop rotation	10	8.33	1	0.84	109	90.83
3.	Recommended varieties, seed treatment and nutrient management	57	47.50	13	10.83	50	41.67
	i) Improved varieties	93	77.50	0	0.00	27	22.50
	ii) Seed treatment with biofertilizers	29	24.17	15	12.50	76	63.33
	iii) Seed treatment with fungicide	30	25.00	5	4.17	85	70.83
	iv) Doses of chemical fertilizers	77	64.17	31	25.83	12	10.00
4.	Intercultural practices	65	54.16	50	41.67	5	4.17
5.	Water management	12	10.00	4	3.33	104	86.67
6.	Pests, diseases and it's control	16	13.33	30	25.00	74	61.67
	i) Major pests	27	22.50	50	41.67	43	35.83
	ii) Pests control	5	4.17	10	8.33	105	87.50
7.	Harvesting, threshing, yield and storage	101	84.17	19	15.83	0	0.00
	i) Harvesting	120	100.00	0	0.00	0	0.00
	ii) Threshing procedure	120	100.00	0	0.00	0	0.00
	iii) Precaution whole storage	64	53.33	56	46.67	0	0.00

study are supported by the results of Jaiswal (2001) and Asane (2003).

Social Participation and Technological Gap: Socio participation negatively and non-significantly correlated with technological gap. This may be due to the fact that the majority of the soybean growers were not involved in any formal and informal social organization.

Socio-Economic Status and Technological Gap: A negative and significant relationship was established

Table 3: Correlation of Characteristics of Soybean Growers with their Technological Gap

No.	Variable	'r' value
		Technological gap
I.	Personal and socio-economic variable	
	1) Age	-0.1313
	2) Education	-0.4739 **
	3) Annual income (`)	-0.4815 **
	4) Landholding (ha)	-0.5480 **
	5) Social participation	-0.1213
	6) Socio-economic status	-0.6650 **
II.	Situational variable	
	7) Area under soybean	-0.5778 **
III.	Psychological variable	
	8) Scientific orientation	-0.1809
	9) Economic motivation	-0.1613
IV.	Communication variable	
	10) Information sources	-0.4034 **
V.	Knowledge	-0.7619 **

*** Significance at 0.01 level of probability*

between socio-economic status and technological gap. Better financial resources and increase in socio-economic status allows an individual to invest more on recommended practices. The results were well supported by Jaiswal (2001).

Area under Soybean and Technological Gap: Area under soybean crop negatively and significantly correlated with technological gap. The farmers with larger areas might have used inputs recommended for soybean cultivation. The study findings are in line with the findings of Jaiswal (2001).

Scientific Orientation and Technological Gap: Scientific orientation exhibited negative and non-significant relation with technological gap. This finding is not in line with the results of Gogoi and Phukan (2000) and Chaudhari et al. (2001).

Economic Motivation and Technological Gap: A negative and non-significant relationship was discovered between economic motivation and technological gap. The findings did not confirm with the findings of Jaiswal (2001).

Information Sources and Technological Gap: A negative and significant relationship was observed between information sources and technological gap. It indicated that higher access to various information sources motivates one to follow recommended practices.

Knowledge and Technological Gap: Knowledge negatively and significantly correlated with technological gap. Higher knowledge motivates one to implement the recommended technology.

Knowledge negatively and significantly correlated with technological gap. Higher knowledge motivates one to implement the recommended technology

Multiple Linear Regression of Technological Gap with Selected Independent Variables

The data in Table 4 revealed that out of ten variables only three – land-holding, social participation and area under soybean knowledge – contributed significantly towards the variation in technological gap of recommended soybean cultivation practices to the extent of 72.40 percent. The coefficient of determination was 0.724.

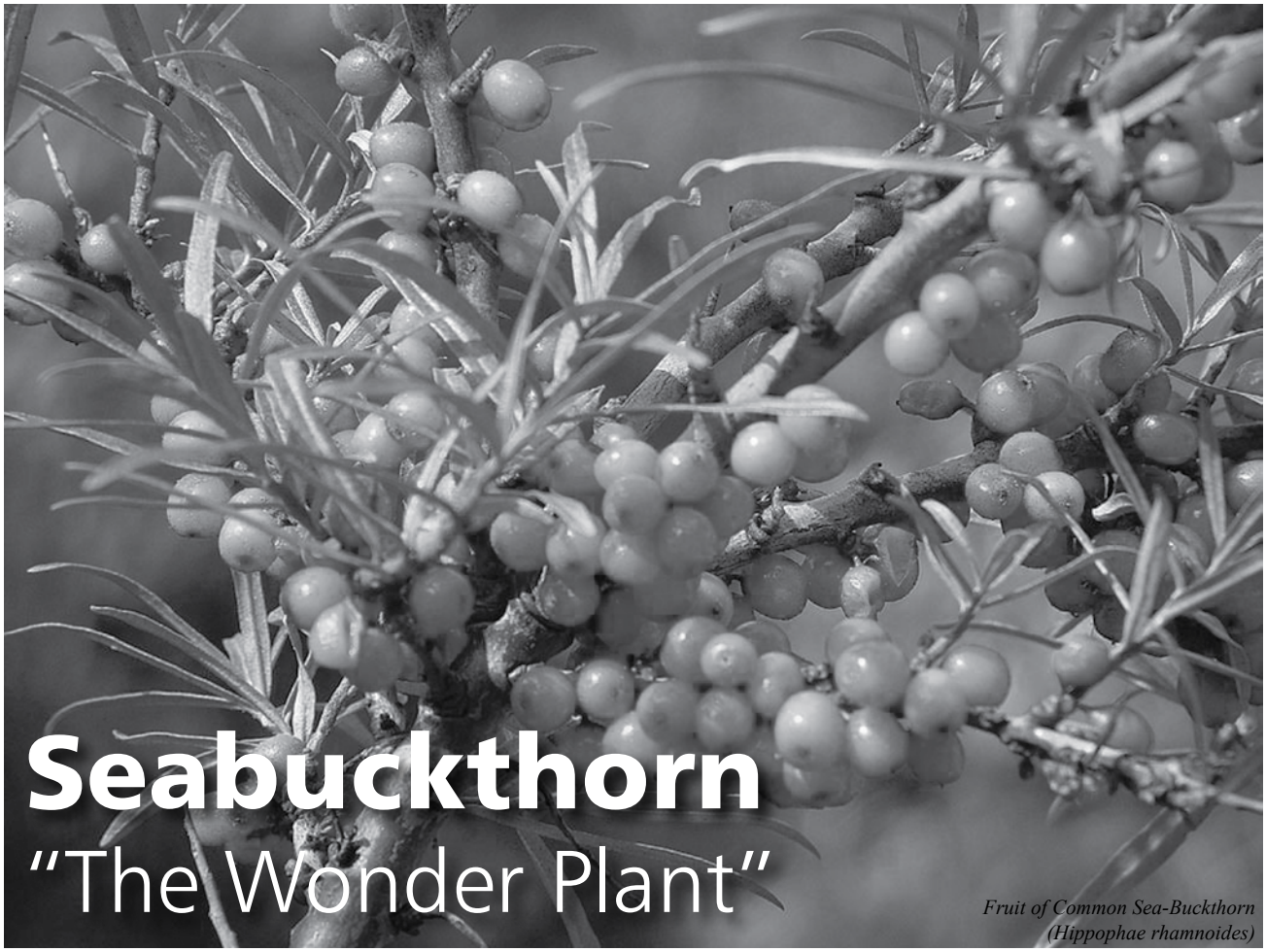
Thus, the technological gap in recommended cultivation practices of soybean were determined by the selected personal, socio-economic, psychological and communication characteristics. Among them, landholdings, social participation and area under soybean were more prominent. In the simple relational analysis, social participation was not related to technological gap. It may be inferred that landholding, social participation and area under soybean are the factors that determine technological gap.

Table 4: Multiple Linear Regression of Selected Independent Variables with Technological Gap

No.	Variable	Regression coefficient 'b'	S.E. of 'b'	't' value of 'b'
1	Age	-7.820	0.050	-1.574
2	Education	-0.225	0.209	-1.077
3	Annual income (`)	-1.290	0.000	-1.572
4	Landholding (ha)	0.485	0.237	2.045 $_1$
5	Social participation	0.150	0.469	0.320 $_2$
6	Socio-economic status	-0.683	0.523	-1.306
7	Area under soybean	-0.911	0.264	-3.454 $_2$
8	Scientific orientation	-1.600	0.189	-0.085
9	Economic motivation	0.248	0.188	1.322
10	Information sources	-0.111	0.102	-1.088
11	Knowledge	-0.374	0.043	-8.606 $_2$

Constant (a) = 67.095
R2 = 0.724
F value = 25.809
$_2$ Significant at 1 percent level, $_1$ Significant at 5 percent level

SOURCE: Priya Suranse, Ph.D Research Fellow, YCMOU, Nasik



Seabuckthorn
"The Wonder Plant"

Fruit of Common Sea-Buckthorn (Hippophae rhamnoides)

By **Ms. Sunita Rai ***

Seabuckthorn (Hippophae rhamnoides L.) is largely unknown but probably the most fascinating and amazing plant species of the world. This plant is poised to become the next Cinderella crop. Pricky and unlovely, this woody but stress-resistant plant has the potential to become the media darling of every food and pharmaceutical company because of its amazing functional and neutraceutical properties.

Seabuckthorn thrives in places in which many other plants cannot. The plant is found at elevations as high as 14,000 feet. The plant is a deciduous, spiny shrub of the family Elaeagnaceae. The plant is hardy, thriving on solid rock formations and is drought, salt and cold tolerant. The leaves are long and narrowed, with shiny attached yellow or orange yellow berries. It can resist temperature from -40oC to 40oC. Its origin is thought to be in the Himalayan Mountains. In India, the fruit grows wild and only very small quantities are being processed.

Distribution: World – China, Russia, Britain, Germany, Finland, Romania, France, Nepal and Bhutan. In India – Himachal Pradesh, Uttaranchal, Jammu & Kashmir, Manipur, Sikkim and Arunachal Pradesh

Properties: Properties of Seabuckthorn are Anti freezing, Antioxidant, Anti ageing, Anticancer, Antibacterial, Anti-inflammatory, Anti tumour and Anti viral.

Nutrients and Potential Health Effects

The Seabuckthorn has a reputation as a great medicinal plant and has been used for centuries in Mongolia, China and Tibet as evident in folk medicine which has been

Many antioxidants are present in seabuckthorn berries, along with vitamins like vitamins C and E, besides being rich in flavonoids, carotenoids, amino acids, dietary minerals, crude fibre, β-sitosterol-polyphenols and oils rich in essential fatty acids

passed from generation to generation. Different parts of seabuckthorn have been used as traditional therapies for diseases. Its bright orange berries not only have great healing properties, but are nutritious and have great therapeutic qualities. Many antioxidants are present in seabuckthorn berries, along with vitamins like vitamins C and E, besides being rich in flavonoids, carotenoids, amino acids, dietary minerals, crude fibre, β-sitosterol-polyphenols and oils rich in essential fatty acids.

Besides these, this plant has the gene for antifreeze which perhaps is the only fruit that claims to have anti-freezing and anti-ageing properties as well. Therefore, there is no exaggeration in calling it the, 'wonder plant'. Antifreeze proteins isolated from seabuckthorn can bring about revolutionary changes in food as well as in medicine sector. The antifreeze protein from this plant besides lowering the freezing temperature can retard re-crystallisation by preventing nucleation and growth of ice crystals. Once isolated, this protein can act as cryoprotectant to preserve food products, possibly blood platelets, human organs for transplantation since antifreeze proteins are about 300 times more effective in preventing freezing than chemical antifreezes at the same concentration.

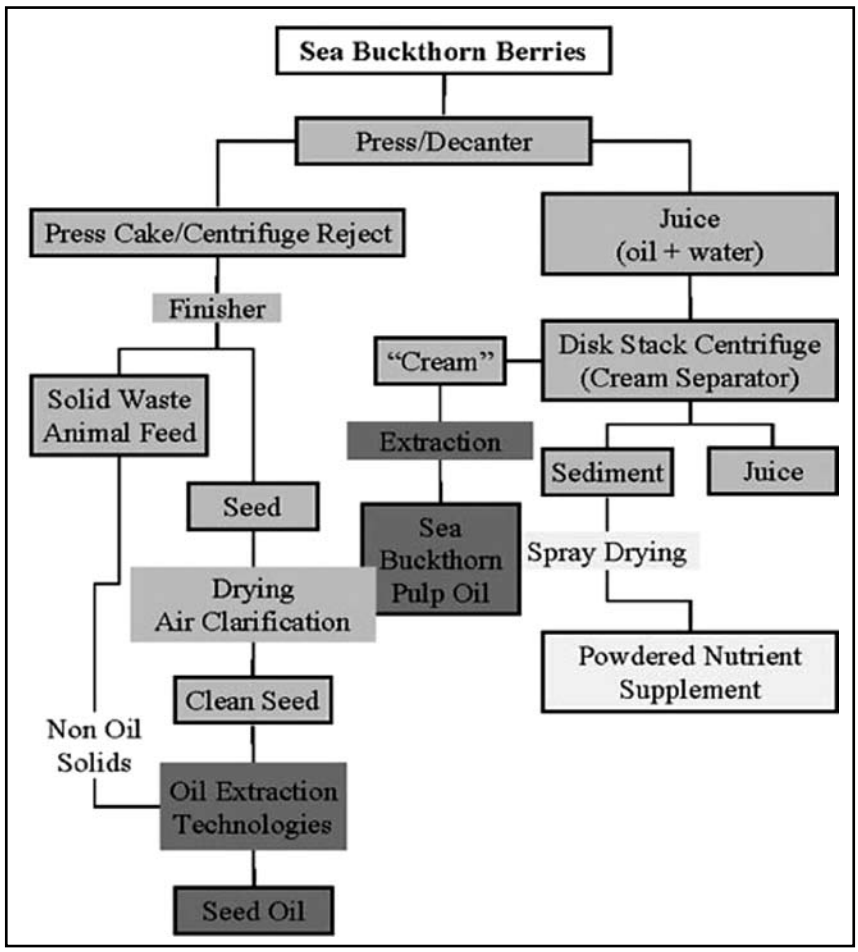


Fig: Processing Method of Seabuckthorn

Health Applications

Seabuckthorn has been shown to have a potent antioxidant activity, mainly attributed to its flavonoids and vitamin C content. Both the flavonoids and the oils from sea buckthorn have several potential applications. Research have been on mainly five focal points : as an aid to patients undergoing cancer therapy; a long-term therapy for reduction of cardiovascular risk factors; treatment of gastrointestinal ulcers; internal and topical therapy for a variety of skin disorders; and as a liver protective agent for chemical toxins and a remedy for liver cirrhosis. These can be summarized as given below:

Cancer Therapy: It has been found that hippophae extract protect the bone marrow from damage, helps faster recovery of bone marrow cell. The seed oil obtained from whole berries, pulp and seeds have been found to enhance non-specific immunity and to provide anti-tumor effects in preliminary laboratory studies.

Cardiovascular Diseases: A liquid preparation of seabuckthorn flavonoids with carthamus (safflower) and licorice, called Ai Xin Bao from the Shanxi Ai Xin Biological Technology Development Center, is used in treatment of coronary

heart disease and stroke, through improving blood circulation and restoring cardiac function.

Gastric Ulcers: Hippophae is traditionally used in the treatment of gastric ulcers by normalizing output of gastric acid and reduce inflammation by controlling pro-inflammatory mediators.

Liver Cirrhosis: Seabuckthorn extracts helps normalize liver enzymes, serum bile acids and immune system markers involved in liver inflammation and degeneration. In addition, sea buckthorn oil protects the liver from damaging effects of toxic chemicals, as revealed in laboratory studies.

Skin: Seabuckthorn is rich in palmitoleic acid which is considered a valuable topical agent in treating burns and healing wounds. Palmitoleic acid nourishes the skin when adequate quantities of se buckthorn or its oil is taken orally. Its oil is widely used alone or in various preparations for burns, scalds, ulcerations, skin damaging effects, therapeutic radiation treatment and cosmetic laser surgery and infections. It is also an ingredient in sunblock-hippophae for UV-blocking activity as well as emollient properties and it is an aid in promoting regeneration of tissues.

The fruit may also be used for benefiting the hair: the name hippophae, means shiny horse, probably believed to be the good coat developed by horses feeding on the plant. The preparations from the berries are also utilized to prevent gum bleeding, to help recuperate mucous membranes of the stomach and other organs. According to the Chinese Pharmacopeia, internal use of sea buckthorn is recommended as a pain reliever, cough suppressant, expectorant, digestive tonic and blood flow promoter.

Uses

In preparation of Juices, RTS beverages, squash, jam, jelly, protein rich ice cream, anti-ageing cream, face pack etc.

Some of the products available in India are 'Leh Berry juice" for jawans in Siachen valley manufactured by Ladakh Foods Ltd, under technical support from Defence Research Development Organization. Another company, Compact International Ltd also is manufacturing Seabuckthorn products in India. In Finland, a specialty beer called Tyrnilambic Baie d'Argousier is manufactured by Cantillon Brewery in Brussels and is quite popular.

Manufacture of Sea Buckthorn Products

Following is a diagram of a processing method that can be used to separate useful components of the berries, yielding the key products of juice, dried fruit nutrients and oil from the seeds and pulp. The residues obtained can be utilized as valuable animal feed. New technologies involving supercritical carbon dioxide extraction are now being used in China to efficiently produce the oil products.

The berries of seabuckthorn when pressed, its juice separates into three layers. The top layer contains a thick, orange cream, in the middle, which has high content of saturated and polyunsaturated fats and the bottom layer is sediment and juice containing fat. The upper two layers can be processed for skin creams whereas the bottom layer can be used for edible products like syrup.

India holds tremendous potential in respect to Seabuckthorn fruit production and processing. Only a few companies have taken up production and processing on full scale but this is bound to become the limelight of every food and pharmaceutical company in the near future due to its various functional and neutraceutical properties.

SOURCE: Manager - Quality Control, Annapurna Food and Beverage, Guwahati

New Milk Variant - High on Nutrition, Flavour, Needs no Boiling

By **Mr. Edmund Piper and Mr. Ramesh Rao ***

Bhagyalaxmi Dairy Farm (P) Ltd has surprised many with the launch of a premium milk offering titled 'Pride of Cows'. Priced at Rs. 75, the milk needs no boiling and is high in nutritional value, is specially packaged, is carefully handled and is hand-delivered to the customer's doorstep every morning. It bears a distinct flavour of delicious full-bodied milk, which is richer and creamier than regular milk.

The milk comes from a herd of specially-imported Jersey-Holstein cross-bred cows. The brand will be available in one-litre bottles priced at Rs. 75 per litre, a jump from the average price of Rs 28 per litre. These cows are being fed a special diet that abounds in iron, vitamins and Omega-3 fatty acids. The Pride of Cows brand will ensure milk that is exceptionally clean and low in bacterial count, which makes it a healthy alternative.

Black-and-White Holsteins, originally from the Netherlands, are most widely used for milk production in the US, while the brown Jersey cow, originally from the British Isles, is known for its creamy milk. The cows will be fed a special fodder, which is rich in iron, vitamins and Omega-3 fatty acids.

People have become very health-conscious and have shown a lot of interest. State-of-the-art technology and temperature controlled logistics make it the first of its kind in the category.

The milk is instantly pasteurized, chilled and packaged in bottles with no human contact to ensure that the milk is hygienically procured. In fact, every cow goes through an electronic health check

up every time it is milked, to ensure that it is at peak health for milking.

Trained, uniformed delivery staff will transport the milk from Govardhan's Bhagyalaxmi Dairy Farm near Pune to the homes of South Mumbai in a refrigerated vehicle. South Mumbai families were selected following a survey done by the company. The unique F2H (Farm-to-Home) initiative will allow customers access to milk which is produced without human interference at the company using state-of-the-art technology and global best practices.

The offering is the first-of-its-kind to use temperature-controlled logistics in order to deliver taste and experience to its customers. It will be ensured that the milk is exceptionally clean and low in bacterial count, which makes it a healthy alternative. Hence, the high cost is because the process of making milk is expensive, cows are expensive, and the feed given to them and other machinery adds to the cost.

Bhagyalaxmi Dairy Farm is spread over 35 acres housing 3,800 Holstein Freisens breed of cow. It is located between Bheema River and The Western Ghats in Manchar near Pune

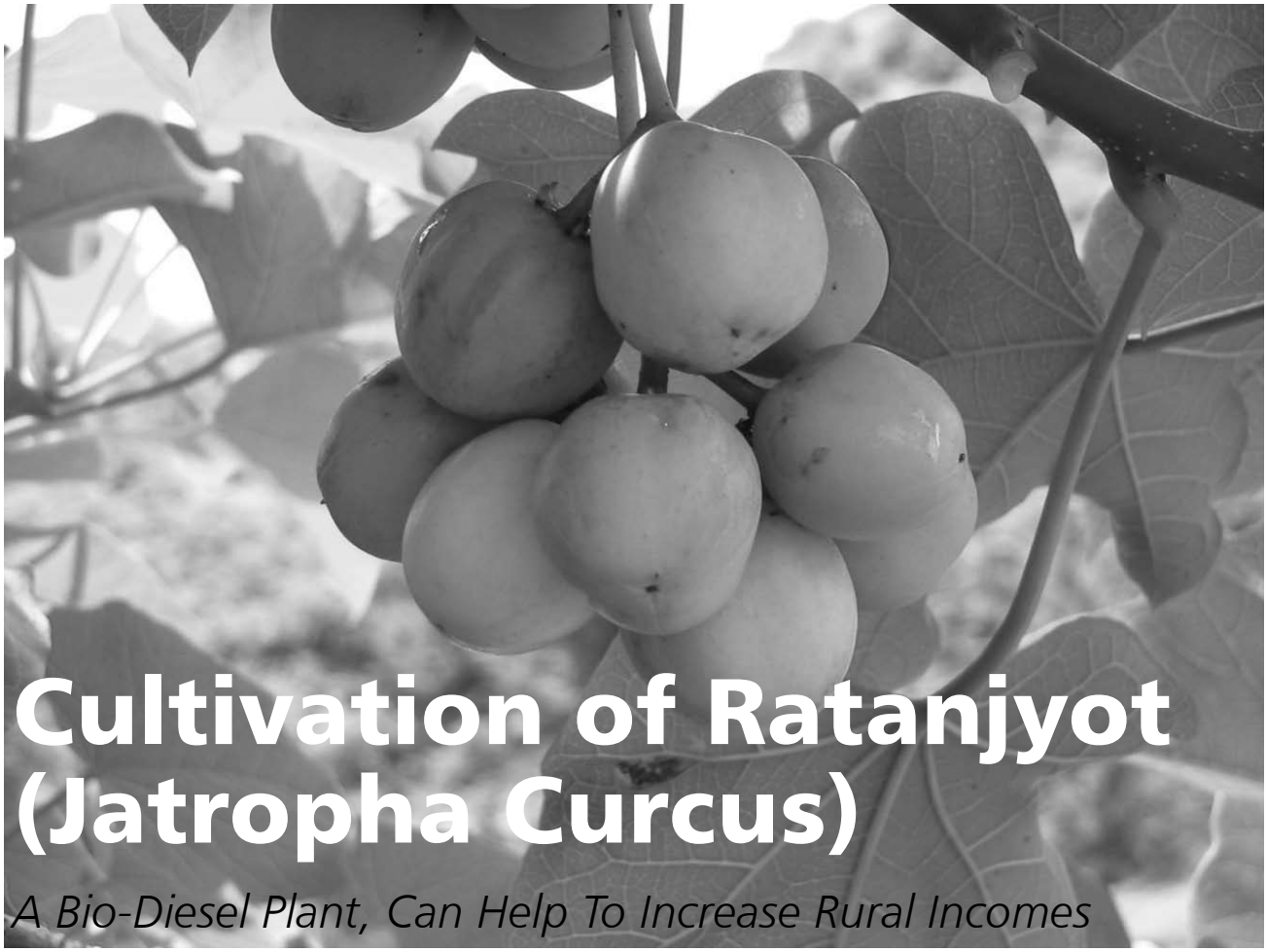
So, when did milk become a luxury product? In a few months from now it will be for sure. After expensively packaged bottled drinking water, milk seems bent on acquiring the 'luxury' tag.

Bhagyalaxmi Dairy Farm is spread over 35 acres housing 3,800 Holstein Freisens breed of cow. It is located between Bheema River and The Western Ghats in Manchar near Pune.

Going Green is being responsible towards our environment; we now bring this green promise to our customers' breakfast tables in the form of Pride of Cows. The product will be initially be available in South Mumbai. Depending upon the response, it will be launched across the nation, according to company sources.

The company has invested Rs 60 crore for the plant including the cost of milk. The company has done trade shows and other programmes for the product. Currently it is being sold by invitation. So far 1,000 members have signed up and the numbers are likely to increase manifold in the coming months. Pride of Cows will be available exclusively only in South Mumbai at MRP Rs. 75/- per litre.

SOURCE: Edmund Piper, Manager, Bhagyalaxmi Dairy Farm and Ramesh Rao, Brand Consultant, Bhagyalaxmi Dairy Farm



Cultivation of Ratanjyot (Jatropha Curcus)

A Bio-Diesel Plant, Can Help To Increase Rural Incomes

Jatropha curcus, also known as Ratanjyot or Jangli erandi, is a drought-resistant perennial plant that grows almost anywhere – in marginal/ poor soil, gravelly, sandy and saline soils. It can also thrive on the poorest stony soil and can even grow in the crevices of rocks.

It is a small tree or shrub with smooth gray bark that exudes whitish watery latex when cut. Normally, it grows between three and five meters in height, but can attain a height of up to eight or ten meters under favourable conditions.

It has large green to pale-green leaves, alternate to sub-opposite, three-to five-lobed with a spiral phyllotaxis. The petiole length ranges between 6-23 mm. The inflorescence is formed in the leaf axil. Flowers are formed terminally, individually, with female flowers usually slightly larger in the hot seasons.

Fruits are produced in winter when the shrub is leafless, or it may produce several crops during the year if soil moisture is good and temperatures are sufficiently high. Each inflorescence yields a bunch of approximately 10 or more ovoid fruits. A three, bi-valved cocci is formed after the seeds mature and the fleshy exocarp dries. The seeds become mature when the capsule changes from green to yellow, after two to four months.

Once grown, the crop has fifty years of life. Fruiting can take place in this plant in two years. It yields five to twelve tonnes per hectares of oil seeds and produces two to four tonnes of bio-diesel

Cultivation Timings of Jatropha

Nursery raising time: Feb-March, Sep-October
Transplanting of saplings: February-April
In monsoon months - Direct seeding sowing: after good rainfall
Direct planting by cuttings: Two month before monsoon
Manuring time: On transplantation and after one year
Pruning time: March-May
Flowering time: May-September,
Fruiting time: July-November
Harvesting time: August-December (North India)

Jatropha plant produces seeds with an oil content of 37 percent. The oil contains 21 percent saturated fatty acids and 79 percent unsaturated fatty acids. There are some chemical elements

in the seed which are poisonous and render the oil not appropriate for human consumption.

Uses of Jatopha Curcus (Ratanjyot)

- Non-edible vegetable oil of Jatropha curcas has the requisite potential of providing a promising and commercially viable alternative to diesel oil since it has desirable physicochemical and performance characteristics comparable to diesel. Cars could be run with Jatropha curcus without requiring much change in design.
- The oil is used as an illuminant without being refined and it burns with clear smoke-free flame.

- Oil has a very high saponification value and is being extensively used for making soap in some countries.
- The latex of Jatropha contains an alkaloid known as 'jatrophine' which is believed to have anti-cancerous properties.
- It is also used as an external application for skin diseases, rheumatism and sores on domestic livestock. In addition, the tender twigs of the plant are used for cleaning teeth, while the juice of the leaf is used as an external application for piles. Finally, the roots are reported to be used as an antidote for snake-bites.
- The bark of Jatropha curcas yields a dark blue dye which is used for colouring cloth, and fishing nets and lines.
- Jatropha oil cake is rich in nitrogen, phosphorous and potassium and can be used as organic manure.
- Jatropha leaves are used as food for the tusser silkworm.

Jatropha curcus or Ratanjyot, can prove itself to be a miracle plant by turning wasteland into a moneymaking land. It can help to increase rural incomes, self-sustainability and alleviate poverty for men, women, the elderly, children, tribal communities and small farmers.

SOURCE: Research conducted by Krishisewa Kendra

करेले में संकर बीज उत्पादन तकनीक

डा. आनन्द पाल सिहं एवं इकबाल सिहं *

संकर बीज (hybrid seed) उत्पादन फसल के लिए चयनित खेत स्वैछिक रूप से उगने वाले पौधों से मुक्त होना चाहिए तथा खेत की मिटटी बुलई दोमट या दोमट व उपजाऊ होनी चाहिए। खेत समतल तथा उसमें जल निकास व्यवसथा के साथ सिचाई की समुचित व्यवस्था होनी चाहिए।

जलवायू climate: करेले को गर्मी एवं वर्षा दोनो मौसम में उगाया जा सकता है। परन्तु संकर बीज उत्पादन के लिए शुष्क, गर्म जलवायु (dry hot climate) अच्छी होती है क्योकि तब कीडों व रोगों का प्रकोप कम होता है। फसल में अच्छी बढवार,पुष्पन व फलन के लिए 25 से 35 डिग्री सें.ग्रेड का ताप अच्छा होता है। बीजों के जमाव के लिए 22 से 25 डिग्री सें.ग्रेड का ताप अच्छा होता है

बीज स्रोत Seed source: पैतृक जननो के बीज सम्बधित कृषि अनुसंधान संस्थान या कृषि विश्वविद्यालय से ही लेने चाहिए।

पृथक्करण दूरी Isolation: संकर बीज फसल खेत करेले की अन्य किस्मों,उक्त संकर की व्यवसायिक फसल तथा करेले की अन्य प्रजातियों जैसे वालसम ऐपल, ककरोल और जंगली करेले से न्यूनतम 1000 मी. की दूरी होनी चाहिए। अगर नर व मादा पैतृकों की बुवाई अलग अलग खन्डो में की गयी है तो उनके बीच कम से कम 5 मी. की दूरी आवश्यक है ।

पुष्प जैविकी Flowral morphology: करेला उभयलिंगाश्री पौधा है, नर व मादा फूल एक ही पौधे पर लगते हैं। फूलों का रंग पीला तथा नर फूलों के डंठल मादा फूलो से लम्बे होते हैं। मादा फूलों में नीचे करेले जैसी आकृतिया होती है। नर फूलों की संख्या मादा फूलो की अपेक्षा बहुत अधिक होती है। पुष्पन सुबह 5.30 से 9.30 बजे तक होता है तथा इसी समय मादा फूल में वर्तिकाग्र अत्यन्त सुग्राही होता है। नर फूलों में परागण प्रातः 7.30 तक प्रचुर मात्रा में मिलते हैं।फूल मात्र एक दिन के लिए ही खिलतें हैं।

खाद एवं उर्वरक Fertilçer: 25–30 टन गोबर की खाद या कम्पोस्ट खाद को बुवाई से 25–30 दिन पहले एक हैकटेयर खेत में मिलाना चाहिए। बुवाई से पहले नालियों में 50 किलो डीएपी, 50 किलो म्यूरेट आफ पोटास का मिश्रण प्रति हैक्टेयर के हिसाब से (500 ग्राम प्रति थमला) मिलाऐं। 30 किलो यूरिया बुवाई के 20–25 दिन बाद व 30 किलो यूरिया 50–55 दिन बाद पुष्पन व फलन के समय डालना चाहिए। यूरिया सांय काल मे जब खेत मे अच्छी नमी हो तब ही डालना चाहिए।

बीज की मात्रा व बुआई Seed rate & sowing: मादा पैतृक के लिए 1.75 किग्रा तथा नर पैतृक के लिए 0.5 किग्रा बीज प्रति एकड पर्याप्त होता है। पौध तैयार करके बीज फसल लगाने पर

बीज मात्रा मे कमी की जा सकती है। बुवाई पूर्व बीजों को बाविस्टीन (2 ग्रा प्रति किलो बीज दर से) के घोल में 18–24 घंटे तक भिगोये तथा बुवाई के पहले निकालकर छाया में सुखा लेना चाहिए। बीज 2 से 3 इंच की गहराई पर करना चाहिए। बुआई दो प्रकार से की जाती है (1) सीधे बीज द्वारा (2) पौध रोपण द्वारा

दक्षिण भारत में करेले की बीज फसल की बुवाई सीधे बीजों द्वारा की जाती है। उत्तर भारत मे सीधे बुवाई मार्च के पहले पखवाडे में ही सम्भव है परन्तु मार्च में बोई गयी फसल मे कम बीज उपज के कारण बीज उत्पादन लाभकारी नही होता। इस लिए यहां पौध तैयार करके फरवरी के प्रथम सप्ताह में रोपाई करके बीज फसल उगाना अच्छा रहता है। संकर बीज उत्पादन के लिए बुवाई/रोपाई नालियों में केवल एक तरु करनी चाहिए तथा नालिया बनाते समय क्षेत्र विशेष में हवा की दिशा का ध्यान मे रखना चाहिए। उत्तर भारत में बुवाई/रोपाई नालियों में मेंढो पर पूर्व दिशा में करना चाहिए तथा नालिया उत्तर दक्षिण दिशा मे बनाते हैं।

फसल अंतरण Seperation: नाली से नाली की दूरी 2 मी., पौधे से पौधे की दूरी 50 सें.मी. तथा नाली की मेढों की ऊचाई 50 सेंमी रखनी चाहिए। नालीयां समतल खेत में दोनो तरफ मिट्टी चढाकर बनाऐं। खेत मे 1/5 भाग मे नर पैतृक तथा 4/5 भाग में मादा पैतृक की बुआई अलग अलग खण्डो में करनी चाहिए।

परागण विधि Pollination: करेला उभयलिंगाश्री होने के कारण इसमें संकर बीज उत्पादन के लिए हाथ द्वारा परागण करना ही उचित एवं प्रचलित है। इस विधि में मादा पैतृको में से नर फूलों को खिलने से पहले ही तोडदिया जाता है। साथ ही मादा फूलों को भी खिलने से दिन पहले सांय के समय बटर पेपर बैग (7.5X12 से.मी) में बंद कर देते हैं। लिफाफे में हवा आने जाने के लिए 5–6 छिद्र अवश्य करें। इसी प्रकार नर पैतृक पौधो में नर फूलों को भी बटर पेपर बैग या नमी ना सोखने वाली रूई से अच्छी तरह ढक देते हैं। अगले दिन नर खंड से नर फूलों को तोडकर इक्कटठा कर ले तथा मादा पैतृक में मादा फूल का लिफाफा हटाकर हाथ से परागकोष को रगडकर या परागकण ाों को इक्कटठा करके ब्रुश से परागण करें। परागण के तुरन्त बाद मादा फूलों को दोबारा ढक दें। मादा फूलों का बटर पेपर बैग 8–10 दिन बाद ही हटायें। एक पौधे पर इस प्रकार से 4–5 फल तैयार करें। अधिक फल बनने से फल पूरी तरह विकसित नही हो पाते।

फसल देखभाल Crop care: संकर बीज उत्पादन खेत का चार अवस्था में निरीक्षण करना चाहिए। प्रथम पुष्पन से पूर्व, जिसमें मादा एवं नर पैतृकों के बढवार, पत्ते की आकृति रंग व शीर्ष भाग पर रोये आदि को देखकर अवांछनीय पौधो को निकाल दे। दूसरी व तीसरी बार पुष्पीय लक्षणों एवं फलों के आधार पर अवांछनीय पौधों को पहचानकर निकालते हैं। चौथी बार फलों की तुडाई व पकने पर फलों के विकास, रंग आकार एवं रोग आदि की स्थिति को ध्यान में रखकर अवांछनीय पौध ाों व फलों को हटाऐ।

फल तुडाई व बीज निकालना Harvesting: फल परागण के 28 से 30 दिन बाद पकने लगते हैं। पकने पर फल चमकीले नारंगी रंग के हो जाते हैं। फल को तभी तोडना चाहिए जब फल का कम से कम दो तिहाई भाग नारंगी रंग का हो जाये क्योकि कम पके फल में बीज अल्प विकसीत रहते हैं। अधिक पकने पर फल फट जाते हैं और बीज का नुकसान होता है और कभी कभी पक्षियों द्वारा भी बीज का नुकसान हो जाता है। पके फलो को दो भागों में फाडकर हाथ से बीजों को निकाले तथा रेत या साफ मिट्टी से मसलकर बीजों से चिपचिपी झिल्ली को हटा देना चाहिए। इसके बाद बीजों को साफ बहते पानी में धुलाई करके तेज धूप में सुखाना चाहिए।

बीज उपज Seed production: उत्तर भारत में दक्षिण भारत की अपेक्षा बीज उपज बहुत कम होती है। दिल्ली में 15 से 18 बीज प्रति फल जबकि रानीबेनूर में औसत 25 से 28 बीज प्रति फल मिल जाते हैं। इसी प्रकार दिल्ली में 4 से 6 फल प्रति पौधा जबकि रानीबेनूर में औसत 15 से 18 फल प्रति पौधा मिलते हैं। उत्तर भारत में 30–45 किग्रा तथा दक्षिण भारत में 150–180 किग्रा बीज प्रति एकड उपज मिलती है। 1000 बीजों का भार 150 से 170 ग्राम होता है.

SOURCE: डा.आनन्द पाल सिहं एवं इकबाल सिहं, तकनिकी अधिकारी,वैजिटेबल डिविजन, भा.क.अ.सं., नई दिल्ली–12

ASSOCHAM Organises 3rd International Summit cum Exhibition on Food Processing, Agribusiness and Dairy

By **Roopa Somasundaran***

The Food Processing sector is expected to grow by 20 percent and value addition to increase by 35 percent by 2015. There is an opportunity for large investments in food and food processing technologies, skills and infrastructure, especially in areas of canning, dairy packaging, frozen food/refrigeration and thermo processing. Realizing this opportunity there is immense need for making Indian products available across the globe and beating international competition while catering to domestic demand.

With this background, ASSOCHAM (Associated Chambers of Commerce and Industry) organized the 3rd International Summit cum Exhibition on Food Processing, Agribusiness and Dairy on 14 September 2011 at Hotel Le-Meridien, New Delhi for increasing visibility of Indian processed food, agro and dairy market targeting international marketplace and investments. The event also marked the release of 'ASSOCHAM–I-Farms-Frontier Growth advisers-MANAGE Souvenir on Food Processing, Agribusiness & Dairy'.

The Summit cum Exhibition was attended by Senior Industry representatives and experts. Together they offered perspectives on bringing innovation to the food processing sector along with exploring possibilities for investment to increase trade and strengthen global food security.

Mr. D.S. Rawat, Secretary General, ASSOCHAM welcomed the guests. Prominent representatives of the industry shared their insights and expertise on various aspects of Food Processing, Dairy and Agribusiness. Mr. Kuchibotla Srinivas, Operations Head, IFARM Venture Advisors Pvt. Ltd provided an overview of the Agri-Economy and Food Processing industry, which currently stands at US$28 billion and its direct impact on India's GDP. By citing the constraints of land and water, he emphasised on major investments in infrastructure, storage and transportation.

Mr. Heink Van Duijn, Agriculture Counsellor, LNV, Dutch Embassy, presented an interesting study on India's potential in emerging as the world's largest producer of agricultural commodities. By comparing Holland and India, he shared the concept of the 'Golden Triangle'-food innovation, economic stability and increase production. With a population of 17 million, The Netherlands is the second largest exporter of agricultural products in the world. Such a deed is achievable solely through 'Food Innovation'. He recommended that India should develop its public and private partnership.

Dr. (Smt) Renu S. Parmar, Adviser (Industry/VSE), Planning Commission, Government of India supported Mr.

Duijn's views on developing public and private partnership. Dr. Parmar shared that agricultural development is a priority by the Planning Commission of India. The 12th Plan drafted by the Planning Commission of India is targeting a GDP of 8-9 percent. The long term goal is to achieve an ambitious target of 25 percent GDP by 2025.

Mr. C.J. Venugopal, Chairman and Managing Director, IPICOL, Government of Orissa, presented Orissa as the state with phenomenal investment opportunities. With a GSDP at par with the nation's GDP, Orissa attracted FDI of 65 percent in the last three years. Currently, the primary focus of the state is in developing mega food parks.

His Excellency Mr. Freddy Svane, Ambassador, Embassy of Denmark elaborated on the importance of the farmer in agriculture. He emphasised that all efforts should be geared towards bringing 'order in your own house first' by educating and empowering the farmer.

Guest of Honour, Mr. Rakesh Kacker, Hon'ble Secretary, Ministry of Food Processing Industries, Government of India, said that the 12th Plan will be focused towards development of food parks, cold chain processes and will encourage active participation from the states in a bigger way. Equal importance will also be given to resolving issues of skill development. Establishment of Food Technology institutes in Haryana and Tanjavore are efforts in this direction.

Mr. Rajiv Wakhle, Director Operations (Foods), PepsiCo, showed an enlightening film on PepsiCo's collaborative contract farming. He emphasised that researchers and experts of an organisation must educate the farmers on innovative methods of cultivation.

Mr. V.P. Gandhi, Dairy Development Adviser, Paras Dairy made several recommendations to improve dairy production in India and prevent animal slaughter. He stated that export duties should be imposed on de-oiled cakes used in production of cattle feed; that computerised formulas finalised by NDDB should be used; frozen semen banks with progeny tested bulls in milk shed areas should be established; and that FSSA should establish central epidemiological surveillance unit to address food borne diseases.

ASSOCHAM

Being a proactive and responsible chamber, ASSOCHAM gives suggestions to the Government for revitalization of agricultural sector, improvement in production and productivity, stepping up growth rates, enhancement of farmer's income, etc. ASSOCHAM's New Delhi Declaration 2006 acknowledges the importance of innovation to agricultural development and reaffirms its commitment. Some of the major agricultural research projects completed by ASSOCHAM in recent past are as follow:

- Agro-processing and value addition in India; tracks the immense opportunities in Agri-Processed and value added products 2009
- Approach to Food Safety and Quality: Refining Niche in International Food Market 2009
- Food & Agri Exports in India: 'Defining the New Paradigm' 2009
- Way to Organic Farming 2009
- Perspectives of Food Processing
- ASSOCHAM published a series of research studies targeting Food grain Sectors (Wheat, Rice, Pulses and Maize) and Edible Oil Sector in 2008
- Green Revolution – II: A Road Map 2007
- Agricultural Scenario 2007
- Study on Agri Export Zones 2007
- BT Cotton Farming in India 2007

Mr. Gautam Bansal, National Sales Manager, Bayer Material Science Pvt Ltd, brought out the importance of hygiene in walls, ceilings and flooring by using the right coating, adhesive and synthetics.

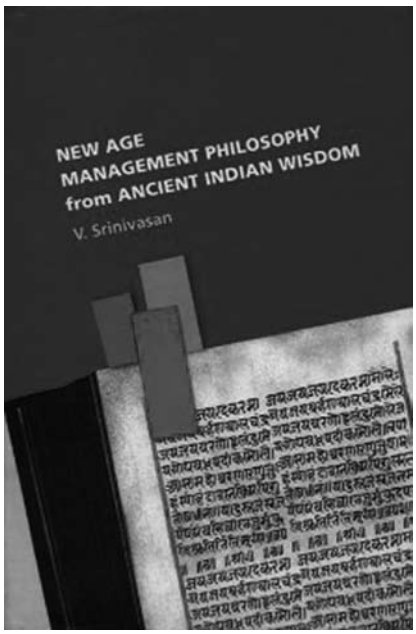
Other eminent guests who participated in the summit as speakers and panellists included: Mr. A. Pradhan, Chief, Business Operation and Development, NRDC; Mr. V.N. Guar, CEO, FSSAI; Mr. Onno Kuiper, Rademaker, Netherlands; Mr. Robert De Vries, IBK, Lt. Col; Satish Sharma, Joint Director, PCRA; and, Mr. Eric Oving, Larive International, Holland.

Dr. Om S. Tyagi gave the valedictory address and concluded the summit with vote of thanks.

SOURCE: Editor, Financing Agriculture Magazine

New Age Management Philosophy from Ancient Indian Wisdom

By **V. Srinivasan**



Though management as a practice is very old, as a subject it has evolved in a big way only in the last fifty years. Today, there are a number of management gurus who have extensively studied this subject and evolved a number of theories relating to it. However, we do not find many ancient books which have codified thoughts pertaining to management. The Thirukural is an exception, despite being two thousand years old.

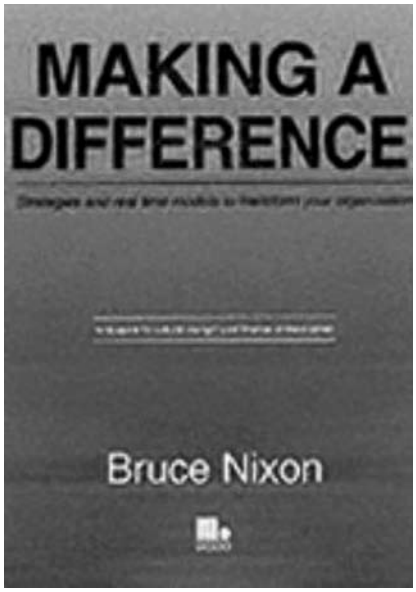
Considered the Tamil Veda, the Thirukural is a treatise on the Art of Living. Its eternal and universal appeal lies in its secular character, clarity of thought, depth of understanding and penetrating insights into the fundamentals of human thought and behaviour.

In this book the author gives examples from his varied global experiences and explains how he has drawn inspiration from the Thirukural to deal with everyday business situations. In what is a fascinating analysis, the author also shows how the thoughts of contemporary management gurus compare with the timeless wisdom contained in the Thirukural.

The book is an indispensable guide for managers, corporate executives, entrepreneurs, students of management and those who aspire to be leaders.

Making a Difference: Strategies and Tools for Transforming your Organisation

By **Bruce Nixon**



This book is about global, organisational and personal transformation. It describes an approach to bringing about organisation transformation, leading change and learning, all at the same time. This approach, called Real Time Development, is based on the idea of not separating learning and changing; not using a didactic approach but instead helping people learn and make changes at the same time. It encourages people to trust their own creativity, wisdom and challenges. Bruce believes that everyone in an organisation and its key stakeholders need to be involved for transformation to succeed.

It is written for leaders at all levels, including CEO's, directors, managers, and internal and external consultants. It presents leading edge ideas in straightforward, accessible language. The book aims to be both inspiring and practical.

The book is in three parts: Part One – Seeing the big global picture; Part Two – Principles, strategies and tools for transformation; and Part Three – Taking practical steps. It contains a Strategic Leadership Model, that is a well tried process for facilitating strategic change and learning.

AGRI NEWS

Agriculture Loan Waiver is Actually Hurting Farmers

The government's move to appease small farmers could actually hurt its electoral chances. Ironically, when P. Chidambaram, as Union Finance Minister, announced in February 2008, his government's decision to write off loans of farmers to the tune of around Rs. 60,000 crores, it was hailed as 'a historic decision'. The loan waiver was expected to cover some 4 crore farmers. Today, that decision could be posing problems for the very farmers it was supposed to protect. There is a great sense of unease in the banking sector.

Few banks are now willing to grant loans to small agriculturists. Earlier, such fears were mostly conjecture. Figures available from the Reserve Bank of India indicate more forcefully that this could soon become a major problem for both small farmers on the one hand, and the banking community on the other.

In fact, this is the second time since Independence that the government in power actually succeeded in eroding the creditworthiness of the most creditworthy segment of India's population – namely, the rural folk with small and marginal incomes.

This is the community that treated debt as something that had to be repaid, even by the surviving relatives of the borrower after the borrower died. Even thinking of not repaying family debt was considered dishonourable and disreputable.

The government, however, encouraged the erosion of such values when it announced the loan melas in the 1980s. Even then, loans to the rural sector began drying up, and it took banks almost two decades to gain confidence that the rural sector was worth lending to. In 2008, such fears were revived and with good reason.

Total outstanding suddenly began shooting up, first by 12 percent in March 2009 and then by a whopping 26 percent by March 2010. The total number of accounts also soared from 382 lakh accounts in 2007-08 to 428 lakh by 2009-10. What is even more interesting is that instead of the small and marginal in rural areas picking up these loans, more and more money began being sourced through urban and semi-urban centres.

As against 85 percent of the loans being sourced from rural banks in rural areas in 1990, by March 2010 only 66 percent of agricultural loans were being sourced through such branches. Instead, agricultural credit from purely urban centres began witnessing a surge. As against 4 percent of such loans being sourced from purely urban centres in 1990, 2009-10 saw the share of agricultural loans soaring to 16 percent. Clearly more agricultural loans were being sourced from cities rather than from villages.

There could be two explanations for this. First, as was the case in 2009, stung by the government's decision to write off loans of small farmers, most banks preferred to de-risk their loans and lend instead to micro-finance institutions (MFIs) which in turn lent money to small and marginal income rural folk at significantly higher rates of interest.

The banning of MFIs has now made many banks opt for lending to agencies which in turn extend credit to the agricultural sectors. These could be large retailers of agricultural products – like food marts — or warehousing companies which in turn could become major lenders to small and large farmers in exchange for the produce they store in these warehouses.

The government's inability to promote more warehouses (under the Warehousing Development Regulations Act), and the state governments' unwillingness to modify laws that could make such warehouses catalysts for rural prosperity and agricultural growth, is obviously going to hurt small farmers terribly in the coming years.

Blend Technology with Farm Practices: Pawar to Scientists

Lauding the 6.6 percent growth achieved by the farm sector last fiscal, Agriculture Minister Sharad Pawar called upon farmers and scientists to work even harder for enhancing the sector's output. He attributed the impressive growth in agriculture to the hard labour of farmers and commendable work done by the farm scientists.

"Today India is a leading producer of wheat, rice, fruits, vegetables, milk and eggs in the world and our farmers and scientists should work harder to further this growth," Pawar said. Pawar pointed out that the agriculture sector is facing challenges like depletion of natural resources, soil erosion, post-harvest losses and climate change, and asked scientists to work on new technologies to overcome them.

AGRI NEWS

Onion Prices Could Rise By 20 Percent

There was jubilation at the wholesale Agriculture Produce Market Committee (APMC) at Vashi recently, after the ban on onion export was lifted. While traders agreed there would be a price hike of around 20 percent, they also warned people to avoid panic buying to ensure the hike is minimal.

The onion traders at APMC had shut the market on September 16, 2011 for two hours to demand the lifting of the ban. They had also threatened to go on an indefinite strike if the Centre did not act fast.

Welcoming the lifting of the ban, APMC director Ashok Walunj said, "The farmers have stocked up on their produce and now they will get a good price for it. The produce should start coming to the market in a couple of days." "The supply to the market had gone down drastically to 60 vehicles a day. We should be back to the average 125 vehicles very soon," he added.

At Kisan Mela, Farmers Urged to Adopt Green Practices

Hundreds of farmer thronged the two agriculture festivals – Kisan Mela at Punjab Agricultural University (PAU) and Pashu Palan Mela at the Guru Angad Dev Universtity on 23rd and 24th of September, 2011. Punjab Agriculture Minister, Sucha Singh Langah inaugurated the Kisan Mela at PAU, while Baldev Singh Dhillon, Vice-Chancellor, PAU presided over the inaugural session. Addressing farmers, Langah said that unwise farm practices were polluting the state's natural resources. Excessive use of water for growing paddy has not only lowered the underground water table but at the same time, reckless use of fertilisers and pesticides have polluted the underground water making it unfit for drinking in some areas of the state.

Vice-Chancellor Dhillon stated that in 1967 PAU was the first university in the country to organise a Kisan Mela. Now it had become a forum for exchange of knowledge between farmers and scientists. Farmers' feed-back, based on their field experiences has become a guiding force for the research programmes at the University, he said. Dr Dhillon also said that government-PAU-farmer linkages were largely responsible for the green revolution in the past and this linkage needed to be strengthened to achieve greater milestones in the future.

High Prices: India Calls for Improved Farm Productivity at G-24

WASHINGTON: Terming high global commodity prices a "grave threat", Finance Minister Pranab Mukherjee has called for developing countries to increase their investments in agriculture to improve crop productivity.

The G-24 grouping comprises 24 developing countries from Asia, Africa and Latin America. It aims to ensure increased representation and participation of developing countries in negotiations on the reform of the international monetary system.

Economic development and poverty alleviation is a challenge and the next few months will be crucial for the global economy. "Increased investment in agriculture and productivity should be the strategic priority of G-24 to cool prices and provide food security to our people. There is a need to ensure transparency in commodity markets," Mr. Pranab Mukherjee said.

Mukherjee further said that the G-24 should continue to push for more ambitious progress on reform of the governance mechanisms of international financial institutions.

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- Comprehensive Watershed Development Project in Karnataka - Watershed Development Department (WDD)-Government of Karnataka – 2006-07
- Madhya Pradesh Tribal Development Project - The International Fund for Agriculture Development (IFAD), Rome – 1997

Grass Roots level Livelihood Implementation

AFC has undertaken large scale Agricultural Extension Programme in 820 Blocks covering all 71 districts of Uttar Pradesh.

The mission of the implementation project is to increase the farm productivity, profitability and sustainability of farming systems, efficient use of natural resources and agricultural inputs etc., by customised farmers' trainings at village cluster level and to provide online information on weather parameters, demand and use of agricultural inputs and market intelligence.

Organic Farming

This project involves the adoption and certification of Organic Farming in 22000 hectares.

Watershed Development

AFC is implementing Livelihood Development Programme based on Watershed Development with funding by DFID, and NABARD.

Panchayati Raj Institutions

AFC has set up an independent division for providing support services in terms of grass roots level planning, training of various stakeholders in UP, Bihar and Jharkhand. AFC has prepared Perspective District Plans in 25 districts of Uttar Pradesh under Backward Region Grant Fund (BRGF).AFC has also conducted TNA and prepared Training Manual for PRIs in Jharkhand.

The PRI division will also provide the following services:

- Organise training programmes for the senior & middle level executives of the NGOs.
- Capacity building of the ERs and various stakeholders.
- Conduct research studies, develop learning material for each level on local self governance, organise seminars and workshops, promote exchange of academic expertise on various aspects related to local planning & DPCs, disseminate specialised information and provide expert advice to all concerned.
- Take up advocacy role to strengthen democratic process, particularly grassroots level democracy through decentralised institutions.
- Lay special emphasis on involving the poor, marginalised and weaker sections of the society in the democratic governance.

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