FINANCING AGRICULTURE

Vol. 43 Issue 8 August 2011

Rs. 50/-

ISSN 0015-2110

Promoting Sustainable Agriculture in India

HOW TO PRODUCE QUALITY SEED OF PUMPKIN

FOOD INFLATION - CHALLENGES WITH VAST OPPORTUNITIES

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

Ministry of Environment & Forests, GoI

Agricultural Finance Corporation Ltd, Mumbai

Usufruct sharing of communities under JFM

Horti-forestry model under Wadi Project

Active involvement of students in World Forestry Day

Articles to be published in this journal may be mailed to fa.afcl@gmail.com only. Authors may indicate their postal address and contact number. Articles may be between 4,000 to 6,000 words. Relevant photographs may also be sent.

EDITORIAL

With a growing economy and increasing global demands for food products, India is undertaking various measures to enhance its agricultural produce. In this issue, we have endeavoured to present a holistic approach for promoting sustainable agriculture. According to recent carbon footprint analysis, the entire chain of food production and consumption accounts for 20 percent of global greenhouse gas emissions. Reducing these greenhouse gas emissions and increasing the long-term storage of carbon in the soil are therefore essential measures to prevent a climate disaster. To feed the world fruitfully into the future, fundamental changes are needed in our farming and food systems.

Benefiting financiers and cultivators alike, this issue covers a gamut of topics ranging from business opportunities in micro-irrigation in India, to rotation farming, countering health problems in India to advantages of minimum support price, significant increase in dairy products consumption to tricks on producing quality pumpkin seeds and many more.

Amongst others, this edition highlights how green manure crops are primarily used in environment friendly agricultural practices to reduce the application of chemical fertilisers and herbicide. An interesting study shows improvement in rural living by adopting simple rural marketing gimmicks. We have also given a brief study on varietal improvement in maize cultivation.

Agricultural and environmental challenges create opportunities for innovative solutions to some of our most pressing environmental and development challenges. Hence, nourishing the agricultural sector is a solution to our global environmental challenges.

Please do leave your suggestions and comments at fa.afcl@gmail.com

A.K. Garg
Editor-in-Chief

I N S

Annual Subscription

India, Nepal and Bangladesh Rs. 600/-

Other Countries (By Air Mail) US$70

Single Copy Rs. 50/-

Agricultural Finance Corporation Limited

Dhanraj Mahal, Chhatrapati Shivaji Maharaj Marg, Mumbai 400 001

Tel: 91-022-22028924
Fax: 91-022-22028966
Email: afcl@vsnl.com
URL: www.afcindia.org.in

I D E

Published by
Agricultural Finance Corporation Ltd.
Dhanraj Mahal, Chhatrapati Shivaji Maharaj Marg,
Mumbai 400 001

Produced by
L.B. Associates Pvt Ltd.
H-108, Sector 63, Noida - 201301
Tel: 91-120-2427280/82,
Fax: 91-120-2427108
Email: binoy@lbassociates.com
Website: www.lbassociates.com

How to Produce Quality Seed of Pumpkin

By **Dr. B.R. Choudhary** *

Pumpkin is one of the most important crops belonging to the family of Cucurbitaceae. Pumpkin now occupies a prominent place among vegetables owing to its high productivity, nutritive value, good storability, and long period of availability and better transport potentialities. It is extensively grown during rainy and summer months in all parts of India. Seed production of cucurbits including pumpkin in India is still dominated by locally available open pollinated cultivars. It is estimated that 70 percent area of different gourds including pumpkin and 60 percent area of melons is covered by unidentified local varieties, although several improved varieties of pumpkin (Kashi Harit, Pusa Vishwas, Pusa Vikas, CO-1, CO-2, Ambili, etc.) are available. Hence, great scope exists to improve the local cultivars by breeding and replacing them with improved varieties and hybrids. The main seed production area of pumpkin in India is West Bengal (West Midanpur and Bankura) and U.P. (Allahabad and Faizabad).

Climatic Requirements and Sowing Time

Pumpkin is a warm season crop that grows best at 21 to 32 degrees centigrade. Freezing kills the plants and cool weather below 16 degrees centigrade slows or stops the growth. Pumpkin seeds germinate and emerge within 3-4 days at a soil temperature and from 6 to 12 days at 20 degrees centigrade. It has been well documented that short days and low temperature condition favour the expression of female flowers in all the cucurbits. Sowing in June-July and February-March ensure proper maturity of both fruits and seeds. Early sowing is quite conducive for fruit and flower development.

Soil and Field Preparation

Pumpkins grow in a wide range of soil types but flourish best in well drained soils with good physical characters and rich in organic matter. Careful irrigation management is required when the crop is grown in clay-loam soil to obtain high yielding crops. Most cucurbits including pumpkin are moderately sensitive to soil salinity, displaying a 50 percent yield reduction in the range of Ec 4 to 6 (mmhos/cm at 25 degrees centigrade). The land should be free from volunteer plants. Field preparation starts 3-4 weeks before seed sowing. Thorough soil preparation and levelling are essential. Nearly 2-3 ploughing and planking is sufficient to obtain good tilth.

Sowing System and Seed Rate

Seeds of pumpkin should be sown on raised beds or furrow or trenches or pits. It is better to train the plants on a bower system for increased seed yield. Trenches are prepared in well prepared field at the distance of 4 m. Generally, depth of trench is kept 20-30 cm with the width of 40-50 cm. Near to these trenches pits of 60x60x60 cm size are dug and filled with well decomposed FYM (4-5 kg per pit) and top soil. Generally, 3-4 g Furadan is mixed in the soil and filled up to the height of 10 cm above ground. In case of raised bed, two seeds per hill should

be sown while three to four seed should be sown in case of pit method. In case of early sowing, sprouted seeds are sown on the ridges. The optimum plant spacing is 4 m between rows and 60-80 cm between hills. Five to six kilogram seed is enough for sowing in one hectare area. It is a must to treat the seeds by adding 4g 'Thiram' in 1 kg seeds. For summer sowing it is also advisable to soak the seeds in water for 24 hours, wrap the moisten seeds in wet gunny bag and keep for 3-4 days in warm place.

Manure and Fertilizers

Fertilizer requirement depends on the nutritional status of the soil. About 200-250 q/ha of well rotten FYM should be added in the field. It should be mixed with the soil at the time of last ploughing or applied to each pit during pit preparation as the case may be. Pumpkin seed crop typically demonstrates on economical fertilizer response to 100-120 kg N, 80-100 kg P2O5 and 60-80 kg K2O per hectare. Half of N and full dose of P and K should be applied pre-plant in the mound and the remainder 5 to 6 weeks after seedling emergence. Additional N should be placed 20-25 cm from the plant row and about even with the bottom of the furrow as top dressing after 25-30 says after sowing. Care must be taken not to cause excessive damage to plant roots. Irrigation water should be supplied shortly after applying the fertilizer to move it towards the plant roots.

Thinning

When the seed is sown on hills, the plants should be thinned so that not more than three plants are left standing on each hill. When sown along the furrows, the plants at each place are thinned to one or two.

Irrigation

Pre-sowing irrigation practice should be implemented if there is insufficient moisture in the soil. It is better to delay further irrigation for some time so that the root system may harden and develop well. Pumpkin seed field should be furrow irrigated instead of flood irrigation, which considerably reduce leaf and fruit wetting and check disease occurrence. Pumpkin has deep root system and therefore requires less frequent irrigations. Irrigation should be stopped at least 15 days before fruit harvest at full ripe stage.

Regular irrigation at an interval of 5-7 days should be given. Avoid the moisture stress during vine development, pre-flowering, flowering and fruit development stages. In rainy season crop, irrigation may not be necessary at all if rainfall is well distributed from July to September.

Weed Management

The field should be kept free of weeds, especially in the early stages. Later on, rapidly spreading vines suppress the weeds. It is desirable to stake this crop during the rainy season. First weeding should be done at 15-20 days after sowing and second at 30-35 days after sowing at the time of earthing. Frequent hoeing in the early stages is also desirable. The pre-emergence application of Alachlor @ 2.5 kg a.i./ha can be used for weed control.

Pollination

Bees are the most reliable and cost effective agent to achieve pollination. Fifty-eight (58) bee species belonging to 29 genera and 6 families visit pumpkin crop. Both pollen and nectar are produced in the staminate flowers and nectar in the pistillate flowers. The pumpkin flowers open at about 5:00 am and wither by 11:30 am. Bee pollination, therefore is most effective in the early morning hours hence, spraying should not be scheduled in the morning hours particularly in the flowering span, which may deter the bees. Most authorities favour keeping one or two beehives per acre when 5-10 percent plants have open flowers. Beehives should be placed in clusters around the periphery of field, with additional hives placed inside the larger fields.

Sex Expression

The sex expression and sex ratio are varietal characters. It is, however, modified by the environment, lower fertility, higher temperature, longer light period all induce maleness. Certain gases and chemicals also affect sex. Both auxins and anti-auxins at proper concentrations modify sex. Gibberillic acid at higher concentrations induces maleness; but at the lower concentration of 10 to 25 ppm increases the number of female flowers. Two sprays at two leaf stages and again at four leaf stage with 25 to 100 ppm maleic acid, 100 ppm of NAA, 3 ppm ethrel, 3 ppm boron or 3 ppm of molybdenum can suppress the number of male flowers and increase the number of female flowers, fruit set and ultimate yield.

Rouging

Rouging of off–types, diseased plants, objectionable weeds, plants of other crops and undesirable plants (wild type) from the seed crop throughout the growing season is a must to maintain the true to type plants. There are four stages of rouging. The first is done before flowering when vegetative characters are checked. The second stage is at early flowering when morphology of the ovary is checked. The third stage is when the developing fruits are checked for trueness to type, and the final rouging is confirming the external morphological characters of the fruits to be harvested. Field inspections for rouging should be based on the stable characters like leaf spot, length of peduncle, shape of peduncle, flaring of the peduncle, ovary shape, matured fruit shape and rind colour of the matured fruit.

Off-type plants are usually detectable fairly early in most of the cucurbits. Bush type plants is a variety, which normally has runners or vice versa is easily detected. Likewise, even in varieties with similar vines, the early shape of the fruit and even the shape of the ovary at flowering will sometime reveal on off-type plants. Although some damage may have already resulted from cross pollination, such off-type plants should be considered as a unit. Through some minor injury a fruit may be off-shape, but if the plant, from which it comes, as well as the other fruits borne on it, is all true to type, the seed within the deformed fruit should be no less satisfactory and hence should not be rejected.

Isolation

Maintaining proper isolation distance is a must for obtaining pure seed. The seed production field should be isolated from other varieties/species, which are cross-compatible, the four Cucurbita species

namely; moschata, pepo, maxima and mixta are treated as a unit and some intercrossing can occur among these species. Keeping the heavy and sticking nature of the pollen in view, 1000 m and 500 m isolation distance is sufficient for foundation and certified seed production, respectively.

Integrated Pest Management (IPM)

IPM depends on the judicious use of the agrochemicals, management of the pollinators, production technology adjustments and tolerance level of pest management. Red pumpkin beetle attack the plant at an early growth stage of plants. One of the most serious pests of pumpkin, which cause heavy loss, is the Fruit fly. These insects can be controlled by adopting the following schedule:

- Expose the dormant pupae of fruit fly by deep summer ploughing.
- Follow crop rotation incorporating non-cucurbitaceous crops.
- Maintain sanitation in the field through removal and destination of infested fruits immediately after the initial infestation.
- Spray the crop at 2-3 leaf stage with Carbaryl 50 WP @ 2 g/lit. of water to control red pumpkin beetle.
- Application of 0.1% Carbaryl at tender fruit stage (up to 5 days after fertilization) gives excellent control of fruit fly.

Control of aphids in the early stage can effectively check the incidence of some serious diseases like cucumber mosaic, cucurbit aphid borne yellow mosaic, zucchini yellow mosaic, squash mosaic, etc. Cucumber mosaic virus can be controlled by:

Pumpkin varieties take about 85 to 120 days (after seed sowing) to reach maturity. Fruits are ready to harvest when fruits redden and seeds inside the shell break readily from the pulp. Immature seeds adhere to pulp

- Use of resistant varieties.
- Elimination of weed hosts from the field.
- Elimination of infected plants from the field.
- Use of barrier crops like sunflower, sorghum and pearl millet.
- Spraying of plants with Dimethoate (0.05%) or Nuvacron (0.05%) or Metasystox (0.02%) at weekly intervals controls aphid population and the disease spread.

Integrated Disease Management (IDM)

Phytophthora root rot can be a problem early in the season and proper irrigation management can often minimize this. Diseases like anthracnose, downy mildew, powdery mildew and leaf spot attack the pumpkin crop. Adopt the following packages to produce quality seed of pumpkin.

- Select disease free healthy seeds.
- Follow crop rotation.
- Maintain field sanitation.
- Maintain proper drainage and aeration.
- Seed production should be carried out in summer to get disease free seed.
- Treat the seeds with Thiram or Carbendazim @ 2.5g/kg seed.
- Green manuring followed by soil application of Trichoderma @ 5 kg/ha in soil is highly effective in checking most of the fruit rotting.
- Apply Trichoderma @ 15 g/pit during sowing.
- Foliar spray of Carbendazim @ 1 g/ lit. or Chlorothalonil @ 2 g/lit. of water.
- Spray the crop with wettable sulphur @ 2 g/lit. of water to control powdery mildew.
- Collect affected fruits and burn them to reduce primary inoculum.

Harvesting and Seed Extraction

Pumpkin varieties take about 85 to 120 days (after seed sowing) to reach maturity. Fruits are ready to harvest when fruits redden and seeds inside the shell break readily from the pulp. Immature seeds adhere to pulp. The fruits are cut in half and the seeds scooped out. The seeds are removed from the flesh by rubbing over a sieve, and finally winnowed to remove the light matter. Seeds may be washed, if necessary, and dried in trays to safe moisture content of 6 to 8 percent and stored in a cool, dry place.

Pumpkin seeds are embedded in the pulp and the following methods are applied for seed extraction.

Mechanical Method: In this method machines like Axial Flow Vegetable Extractor are used to separate out the pulp from seeds.

Chemical Method: In this method commercial HCl is used to separate the pulp from seeds within 15-20 minutes. Thereafter, the seeds are washed in water and dried to prescribed moisture level.

Seed Yield

Considering the seed production data in this investigation 3-4 q seed can be produced from one hectare area under adequate crop and pollinator management practices.

** Dr. B.R. Choudhary, Scientist, CIAH, Bikaner*

Brief Report on Varietals Improvement in Maize

By **J. Kaul, R. Sai kumar and Sain Dass**

Maize (Zea mays L.) is the most widely distributed crop of the world being grown in tropical, sub-tropical and temperate regions up to 500 and from sea level to more than 3000m under irrigated to semi-arid conditions. Being a versatile crop, it adapts easily to a wide range of production environments.

In India, maize is cultivated over 8.26 million ha with a production of 19.31 million tons with an average productivity of more than 2.4 tons/ha, contributing 8.5 percent to the Indian food basket. It occupies an important place as a source of human food (25%), animal feed (11%), and poultry feed (52%), starch (11%), brewery (1%) and seed (1%). The growth rate of area (2.83%), production (30.93%) and productivity (27.35%) over the past years, has shown a remarkable increase as compared to other principal cereal crops. No other cereal crop has shown the high growth rate as that of maize.

Maize Breeding Activities in India

The maize breeding strategy in India has gone through many phases of switch-over since the inception of All India Coordinated Research Project on maize in 1957. However, the last three to five years have been landmark years since the adoption of high yielding hybrids on farmers' fields proved as critical input for achieving the high growth rate in maize. The breeding activities have, therefore, been re-oriented towards the development of high yielding single cross hybrids for different agro-ecological regions of the country seeing the strength of two-parent crosses for high yield and tackling the problems posed by biotic and abiotic stresses. This has been duly supported by development of vigorous, productive and genetically diverse inbred lines that have good performance per se as well as in cross combinations.

Focus on Inbred-Hybrid Technology

The major mandate of AICRP (Maize) as well as DMR is to evolve and disseminate inbred-hybrid technology. With urbanisation, specialty corn has gained a great acceptability among the masses. Their demand in the Indian market has gone up. Sweet corn and baby corn hybrids/varieties are sought to cater to the demands of peri-urban agriculture. Over the years 131 hybrids have been developed and released since 1961; four dozen are public-bred single cross hybrids of different maturity (extra-early, early, medium and late) and suitable for cultivation in different agro-climatic conditions of the country. Since 2005, as many as 23 normal, seven varieties of Quality protein maize (QPM), and one each of baby corn and sweet corn single cross hybrids have been released.

Thus, in India, maize is the third most important cereal after rice and wheat that provides food, feed and fodder, and serves as a source of basic raw material for a number of industrial products, viz. starch, protein, oil, alcoholic beverages, food sweeteners, cosmetics, bio-fuel, etc. No other cereal can be used in as many ways as maize. Virtually every part of the plant has an economic worth.

SOURCE: Extracts from research by J. Kaul, R. Sai Kumar and Sain Dass, Directorate of Maize Research, Pusa Campus, New Delhi 110 012

Green Manuring
Boon for Rice Farmers

By **Vimal Pratap Pandey, V.P. Chaudhary and B. Gangwar ***

Every farmer knows how much work goes into the production of a basket of compost and carrying it to the fields. But it never seems that the farm production gives an equal return for the hard work that goes into making and carrying the compost. Green manures are a method of replacing that basket of compost with a handful of seed. In this method, the plants that grow from the handful of seed are ploughed back into the soil. After a while in the soil, the plants rot down to become compost. Plants used in this way are called Green Manures. It is a very good way of increasing the fertility of the soil, and can give huge benefits for farmers. Green manure crops are primarily used in environmentally friendly agricultural practices to reduce the application of chemical fertilizer and herbicide.

How to Grow Green Manure Crops

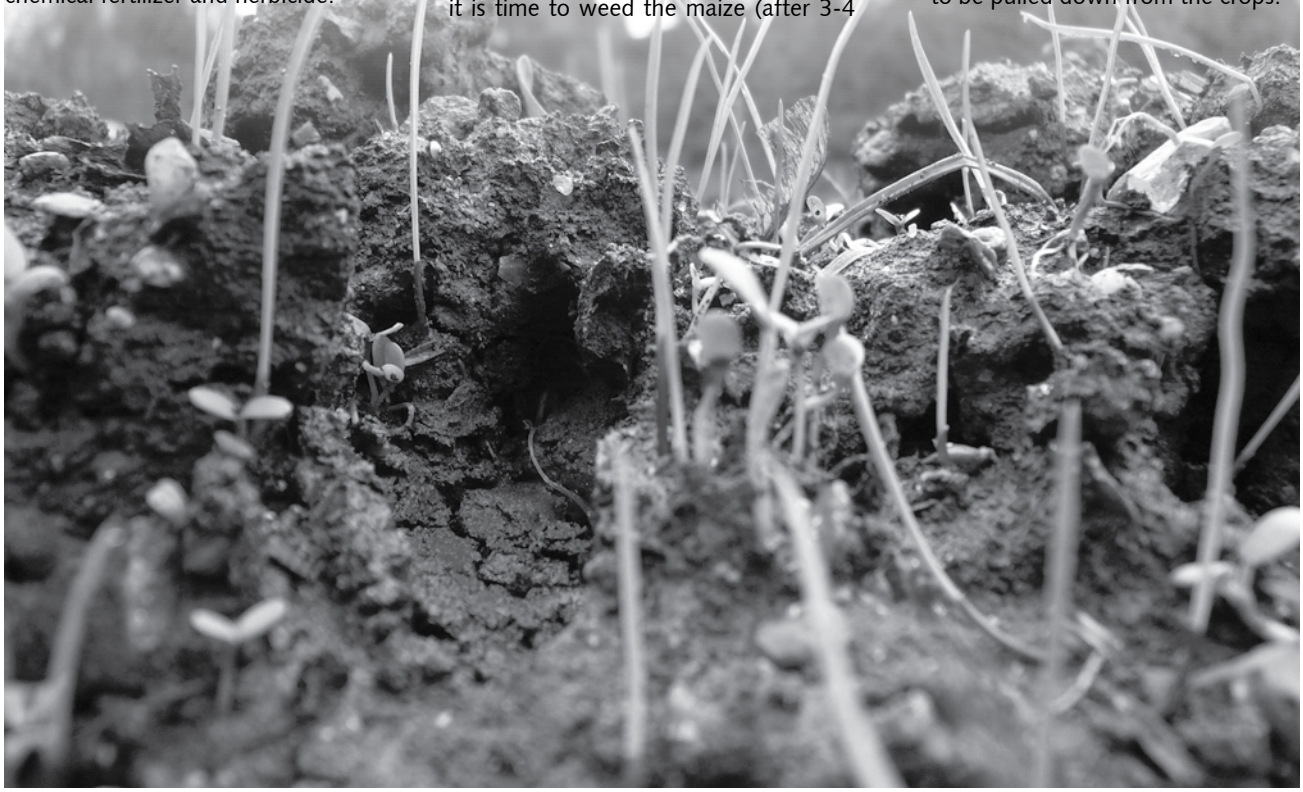
There are basically two ways in which green manures can be used: when land is unused, or fallow between crops; and, while crops are still growing in the fields.

Using Green Manures as Fallow: When crop land is empty after crops have been harvested, green manure seeds can be sown as thickly as sowing wheat. When the green manure plants are about to flower they can be cut and left, or ploughed into the soil.

Using Green Manures Mixed with Crops: This method is mostly used in maize growing areas. An easy method is to sow a green manure at the same time as maize, and then dig it in when it is time to weed the maize (after 3-4 weeks). At this time green manure seeds can also be sown, and the green manure is cut and mulched or ploughed in after the maize is harvested to provide even more fertility.

Green manures are easy to use, but it is important to note certain things, such as:

- Green manures can be used in all seasons;
- Whichever type of green manure is being used, they will give most favourable results if cut and/or ploughed in at flowering time, before seed is set;
- Climbing types of green manures can smother the crops they are grown with. If so, the climbing stems need to be pulled down from the crops.



Selecting Which Green Manures to Use

There are many plants that can be used as green manure. In particular, the type of green manure should be selected according to the type of crop it is growing with or in between. For a large plant like maize, a large green manure like velvet bean or Sesbania should be used. For a short crop like many vegetables, smaller green manures such as mustard or buckwheat can be used. The criteria for selection of green manures include:

- Plants are fleshy and soft;
- Fast growing;
- Fast to decompose;
- Leguminous;
- Do not attract pests and diseases;
- Do not compete with crops;
- Provide nutrients needed in the soil;

Sun Hemp (Crotalaria Juncea)

This is a vigorous growing green manure crop that can be incorporated at ten weeks after sowing. It does not withstand water logging. The seed rate is 25-35 kg/ha. The green matter yield is 15-20 t/ha. Quantity of nitrogen fixed by the crop is 75-80 kg/ha.

Dhaincha (Sesbania Aculeata and Sesbania Rostrata)

Sesbania Aculeata: This is a quick growing succulent green manure crop that can be incorporated at about 8 to 10 weeks after sowing. This crop adapts to varying conditions of soil and climate. It can be grown even under adverse conditions of drought, water logging, salinity etc. Recommended seed rate is 20 to 25 kg per ha. The green matter yield is 10-20 tonnes per ha. Quantity of nitrogen fixed is 75 to 80 kg per ha.

Sesbania Rostrata: This is a green manure crop, which has nodules both on the stem and root. It thrives well under waterlogged condition. The normal seed rate is 30 to 40 kg per ha. To get early, uniform germination and vigorous seedlings, seeds have to be scarified with concentrated sulphuric acid for 15 minutes and then washed thoroughly with fresh water and sown immediately. A green matter yield of 15 to 20 t/ha equivalent to 150-180 kg N/ha is obtained within a period of 8 to 10 weeks.

Wild Indigo or Kolingi (Tephrosia Purpurea)

This is a slow growing green manure crop. It is not grazed by cattle and is suitable for light soils. It resists drought but does not withstand water stagnation. The seed have a waxy, impermeable hard seed coat and do not quickly germinate. To hasten germination, the seeds are to be abraded with sand or steeped in hot water at 55 degrees centigrade for two to three minutes. The seed rate is 20-25 kg/ha and the green matter yield varies from 8 to 10 t/ha. When kolingi is sown in an area for two or three seasons continuously, scattered seeds will give rise to volunteer plants and there is no need for further sowing.

Indigo/Bengal indigo (Indigofera Tinctoria)

Indigo resembles kolingi, but has a more leafy habit. It shows resistance to drought. Better yield is obtained when two irrigations are given and when grown in clayey soil. Seed rate is 20 kg/ha. Green matter production is 8-10 t/ha.

Gliricidia (Gliricidia Maculata)

This is a shrub, which takes up a tree habit under favourable conditions of soil and climate. For green leaf purposes, the shrub should be kept low by pruning or lopping at a height of 2-3 m. The shrub can be pruned two or three times a year and it withstands repeated lopping. Within two years after planting, the plants are ready for lopping. Each plant gives five to ten kg of green leaves annually.

Subabool (Leucaena Leucocephala)

This species, a native of Central America, occurs as a branched shrub. It is a promising forage tree crop, the leaves of which contain about 3-4 percent of N. Leucaena fixes about 500-600 kg N /ha per year.

Cassia (Cassia Auriculata)

This is propagated by seeds. During flowering, tree is topped (stem and branches cut) and loppings used for green leaf manuring.

Green Manuring with Sesbania Aculeate (Dhaincha)

What is Sesbania? Sesbania is a legume commonly used as a green manure crop to add nitrogen and organic matter to the soil. The most common species of sesbania used in Asia are Sesbania cannabina (former name acculeata), S. rostrata and S. cannabina (which produces nitrogen-fixing nodules in its roots). Sesbania rostrata (produces nitrogen-fixing nodules in both roots and stems) and is commonly found in Africa.

Why use Sesbania in rice? The organic matter and nitrogen produced by Sesbania help improve the soil and subsequent crop growth. Under some circumstances, growing green manures is a cheaper and renewable source of Nitrogen, especially when inadequate infrastructure and transport mean that other sources of nutrients (e.g., fertilizer) are expensive or not delivered on time.

How do you manage Sesbania in rice? Sesbania can produce up to 80-100 kg N/ha (equivalent to 4-5 t dry biomass of Sesbania per ha) in around 40 days during the long-day season and in 50-60 days during the short-day season.

When to plant: Sesbania is planted before or after rice, when the land is vacant. Sesbania is highly photoperiod sensitive, flowering in about 35 days during the long-day season and in 125 days during short-day season.

Temperature requirements: Sesbania grows best at temperatures above 25 degrees centigrade.

Land preparation: While Sesbania can be grown with little tillage, more thorough land preparation (e.g., one ploughing and two or three harrowings) gives better crop establishment.

Seed rate: Where weed populations are low, sesbania seeds can be broadcast at a rate of 30 kg per ha before the onset of the rains. With land preparation and irrigation, the seeding rate can be reduced to 16 kg per ha. Seed usually weighs from 14 to 18 g per 1000 seed. To improve germination (up to 65 %) and emergence, seeds can be immersed in water at 100 degrees centigrade for

three seconds. Some farmers scarify the seeds (i.e., slightly split the seed coat) by simply pounding the sacks containing the seed.

Irrigation: The crop does not need to have standing water, but irrigation water should be applied as necessary (e.g., if soil is cracking and sesbania leaves are being shed).

Nutrient Content:

of Sesbania Rostata after 45 Days	
Nutrient	Content (%)
N	2.70
P	0.14
K	1.56

Incorporation: After about 45-60 days, and before it becomes woody, incorporate the Sesbania in one of several ways: e.g., chop the crop for easier ploughing. A faster, and more efficient way is tok-nock over the standing crop of sesbania using for example an animal-drawn wooden plank, and then plough along the direction of the lodged crop. A hydro tiller used for tillage in deep mud, incorporates bulky biomass effectively. The high-speed cage wheel, with short triangular teeth, cuts the biomass into pieces before burying it into the puddled soil. If using the hydro tiller, the field should be water soaked for at least 48 hours before the biomass is incorporated. For large-scale production, a four-wheel tractor fitted with a roto tiller is the most efficient method.

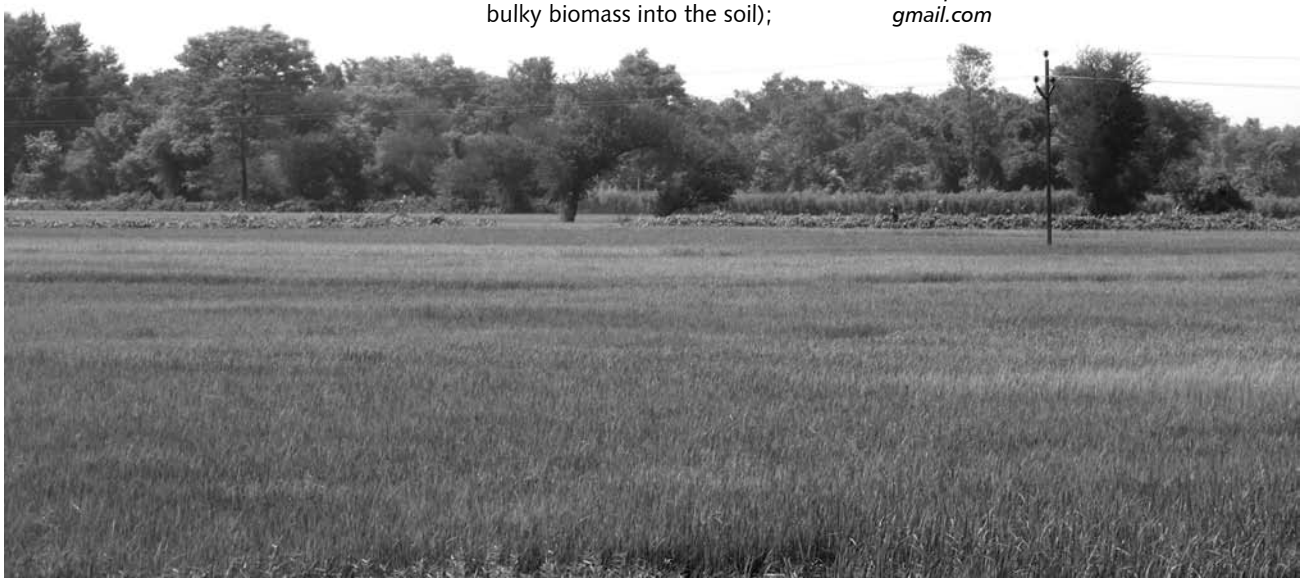
Seed production: Sesbania seeds can be produced by growing when the day lengths are shorter than 11hours. During these periods, Sesbania flowers in 30 to 35 days and bears seed 30 days later. Seeds harvested during the rainy season are often of lower quality as they are often infested with pod borers. Seeds can also be produced on marginal lands, dikes or paddy bunds to reduce costs.

Limitations: Constraints of Sesbania as a green manure include:

- Low seed production;
- Increased labour-requirements (e.g., for ploughing and incorporation of bulky biomass into the soil);
- Sesbania's sensitivity to photoperiod;
- Insect problems;
- Competition with cash crops for land and water;

In this way dhaincha (Sesbania aculeata) is a most suitable crop for green manuring in rice field before transplanting. It gives good results as research shows that 25 percent of the nitrogen need of the crop could be fulfilled by it.

** Vimal Pratap Pandey, V.P. Chaudhary and B. Gangwar, NICRA Project, Project Directorate For Farming System Research, Modipuram Meerut (U.P.), vimal2724@gmail.com*



Minimum Support Price (MSP) – The Armour of Farmers

By **D. Muthamizh Vendan Murugavel ***

Minimum Support Price (MSP) is a part of agricultural pricing policy of the central government. It is considered as a form of market intervention and also as one of the supportive measures (safety nets) to the agricultural producers. Minimum Support Price is the price fixed by the Government to protect the producer farmers against the excessive fall in price during bumper production years. In case the market price for the commodity falls below the announced minimum price due to bumper production and glut in the market, the Government agencies purchase the entire quantity offered by the farmers at the announced minimum price. Minimum support prices for different agricultural crops viz., food grains, oilseeds, fibre crops, sugarcane and tobacco are announced by the Government of India before the start of the sowing season of the crop in Kharif and Rabi seasons. The major objectives are to support the farmers from distress sales and to procure food grains for public distribution.

In recognition of the importance of assuring reasonable produce prices to the farmers, motivating them to adopt improved technology and to promote investment by them in farm enterprises, the Agricultural Prices Commission (Currently known as the Commission for Agricultural Costs and Prices) was established in 1965 to advise the Government on agricultural prices policy on a continuing basis. The thrust of the policy in 1965 was to evolve a balanced and integrated structure to meet the overall needs of the economy and with due regard to the interests of the producers and the consumers.

The rise in MSP is inevitable with increase in cost of cultivation, partial decontrol of fertilizer industry and increase in labour wages due to various programmes like Rural Employment Guarantee scheme. In the phase of liberalization, MSP has a strong linkage to the market. In this situation, three important aspects deserve attention:

- Insulating the farm producers against the unwarranted fluctuations in prices, provoked by higher production and the international price variations;
- Creation of an incentive structure for the farm producers in order to direct the allocation of resources towards desired crops; and,

- Insulating consumers against sharp price rise, which may have been created by monsoon failure or even by vested interest by creating artificial scarcity. The focus is to provide remunerative prices for the cultivators.

The prices of agricultural commodities are usually determined by market factors of demand and supply. If there are many farmers producing the same commodity, then they will fetch a lower price for their produce. If there is great demand from consumers for a certain commodity then farmers can expect to get a higher price. These prices keep changing daily. Other factors that determine the price of the product are quality, yield and pest free status. Climatic conditions, international prices, cost of production and new laws may also affect the prices of agricultural commodities. The price at different markets may be different. The government has fixed minimum support prices for certain agricultural products. Farmers also have the option to sell their produce to private dealers if they stand to get a better profit.

The main reason why the government fixes minimum support prices or MSPs is to ensure remunerative prices to farmers for their produce to encourage higher investment and production of agricultural commodities. The minimum support prices are perceived by the farmers as a guarantee price for their produce from the Government. These prices are announced by the Government at the commencement of the season to enable them to pursue their efforts with the assurance that the prices would not be allowed to fall below the level fixed by

the Government. Such minimum support prices are fixed at incentive level, so as to induce the farmers to make capital investment for the improvement of their farm and to motivate them to adopt improved crop production technologies to step up their production and thereby their net income.

Role of Commission for Agricultural Costs and Prices (CACP)

The Agricultural Prices Commission was set up in January 1965 to advise the Government on price policy of major agricultural commodities with a view to evolving a balance and integrated price structure in the perspective of the overall needs of the economy and with due regard to the interests of the producer and the consumer. Since March 1985 the Commission has been known as Commission for Agricultural Costs and Prices. The Commission is composed of a Chairman, a Member Secretary, two official members and three non-official members. The non-official members are representatives of the farming community. They are usually persons with long field experience and active association with the farming community.

Assurance of a remunerative and stable price environment is considered very important for increasing agricultural production and productivity since the marketplace for agricultural produce tends to be inherently unstable, which often inflicts undue losses on the growers, even when they adopt the best available technology package and produce efficiently. Towards this end, minimum support prices for major agricultural products are fixed by the government, each year, after taking into account the recommendations of the Commission for Agricultural Costs and Prices (CACP).

While formulating these recommendations, the Commission analyses a wide spectrum of data, covering the costs of cultivation/ production, trends and spread of input use, production and productivity of the crop concerned, market prices, both domestic and global inter-crop price parity, emerging supply-demand situation, procurement and distribution, terms of trade between agriculture and non-agriculture sectors, and so on. Since the price policy involves certain considerations of long-run consequences, the Commission also looks at the yield-raising research being conducted by institutions like ICAR. The basic data are generally collected from the Directorate of Economics and Statistics, State Governments, Central Ministries and the nodal agencies concerned with the implementation of agricultural price policy. Besides this, the Commission undertakes field visits for close interaction with farmers in different parts of the country, and also has wider consultation with senior officers, researchers and managers of relevant organizations.

Every year MSPs for major agricultural products are announced which are fixed after taking into account the recommendations of the Commission for Agricultural Costs and Prices (CACP). In formulating the recommendations in respect of the level of minimum support prices and other non-price measures, apart from a comprehensive view of the entire structure of the economy of a particular commodity or group of commodities, the Commission also takes into account the following factors:

- Cost of production;
- Changes in input prices;
- Input-output price parity;
- Trends in market prices;
- Demand and supply;
- Inter-crop price parity;
- Effect on industrial cost structure;
- Effect on cost of living;
- Effect on general price level;
- International price situation;
- Parity between prices paid and prices received by the farmers; and,
- Effect on issue prices and implications for subsidy.

Of all the factors, cost of production is the most tangible one and it takes into account all operational and fixed demands.

The Commission makes use of both micro-level data and aggregates at the level of district, state and the country. The information/data used by the Commission, inter-alia include the following:

- Cost of cultivation per hectare and structure of costs in various regions of the country and changes therein;
- Cost of production per quintal in various regions of the country and changes therein;
- Prices of various inputs and changes therein;
- Market prices of products and changes therein;
- Prices of commodities sold by the farmers and of those purchased by them and changes therein;

- Supply related information – area, yield and production, imports, exports and domestic availability and stocks with the Government/ public agencies or industry;
- Demand related information – total and per capita consumption, trends and capacity of the processing industry;
- Prices in the international market and changes therein, demand and supply situation in the world market;
- Prices of the derivatives of the farm products such as sugar, jaggery, jute goods, edible/non-edible oils and cotton yarn and changes therein;
- Cost of processing of agricultural products and changes therein;
- Cost of marketing – storage, transportation, processing, marketing services, taxes/fees and margins retained by market functionaries; and,
- Macro-economic variables such as general level of prices, consumer price indices and those reflecting monetary and fiscal factors.

Government organises Price Support Schemes as PSS of commodities through various public and cooperative agencies such as Food Corporation of India (FCI); Cotton Corporation of India Ltd. (CCI); Jute Corporation of India Ltd. (JCI); National Agricultural Cooperative Marketing Federation of India Ltd. (NAFED); and Tobacco Board for which the MSPs are fixed. For commodities not covered under PSS, the government arranges Market Intervention on specific request from the States for a specific quantity at a mutually agreed price. The losses, if any, are borne by the Centre and State on a 50:50 basis.

Government has increased Minimum Support Prices for most of the Kharif 2010-11 and 2011-12 crops to boost the output and to increase the rural incomes.

Minimum Support Prices of Kharif Crops – Rs/quintal

Commodity	2005-06	2009-10	2010-11	2011-12*
Paddy (Common)	570	1000+	1000	1160++
Paddy(Grade A)	600	1030+	1030	1190++
Jowar / Bajra	525	840	880	980
Maize	540	840	880	980
Ragi				
Arhar/Tur	1400	2300	3000	3100
Moong	1520	2760	3170	3400
Urad	1520	2520	2900	3300
Cotton–Med. Staple	1760	2500	2500	2800
Cotton – Long Staple	1980	3000	3000	3300

** Proposed: + Inclusive of Rs 50 Bonus; ++ Inclusive of Rs 80 bonus*

Farmers are already in distress due to low returns on their produce and exorbitant cost of agricultural inputs incurred on diesel, fertilisers and pesticides

Minimum Support Prices of Rabi Crops – Rs/quintal

Commodity	2007-08	2008-09	2009-10	2010-11
Wheat	1000	1080	1100	1120*
Barley	650	680	750	780
Gram	1600	1730	1760	2100
Masur	1700	1870	1870	2250
Mustard	1800	1830	1830	1850
Toria	1735	1735	1735	1780

** incentive bonus of Rs. 50*

The MSP for wheat from 2009-10 to 2010-11 has been increased by 1.8 percent (by Rs.20), for barley, by 4 percent (by Rs.30) for Gram 19.3 percent (by Rs.340), for masur by 20.3 percent (Rs.380), for mustard by 1.1 percent (Rs.20) and for Toria by 2.6 percent (Rs.45). It is clearly known that the Government has increased the MSPs for most of the Rabi crops 2010-11.

Minimum Support Prices of Other Crops – Rs/quintal

Name Of Oil Seeds	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Groundnut In-Shell	1520	1520	1550	2100	2100	2300
Rapeseed/ Mustard	1715	1715	1800	1800	1830	1850
Sunflower seed	1500	1500	1510	2215	2215	2350
Soybean (Yellow)	1010	1020	1050	1390	1390	1440
Soybean (Black)	900	900	910	1350	1350	1400
Safflower seed	1565	1565	1650	1650	1680	1800
Sesame seed	1550	1560	1580	2750	2850	2900
Niger seed	1200	1220	1240	2405	2405	2450

** Fair and remunerative price*

Minimum Support Price of Oilseeds

Commodity	2007-08	2008-09	2009-10	2010-11
Copra - Milling	3620	3660	4450	4450
Copra - Ball	3870	3910	4700	4700
De-Husked Coconut	-	988	1200	1200
Jute	1055	1250	1375	1575
Sugarcane	81.18	81.18	129.84*	139.12**

*** At 9.5 percent recovery, subject to a Premium of RS.1.46 for every 0.1 percent increase in the recovery above 9.5 percent.*
Source: Ministry of Agriculture

The MSP for copra (milling &ball) for the season 2010-11 has been constant. The MSPs of jute and sugarcane has been increased for the 2010-11 season.

The steep rise in MSP is seen in few edible oil seeds to encourage cultivation of those having shortage of supply for many years which could be seen from the MSPs of oilseeds.

Conclusion

Agriculture continues to be a non-profitable venture and the plight of farmers is going from bad to worse. Farmers are already in distress due to low returns on their produce and exorbitant cost of agricultural inputs incurred on diesel, fertilisers and pesticides. The Centre should appreciate the ground realities. The Centre should realise the contribution of farmers on ensuring national food security. Here, the MSPs play a pivotal role to boost the farmers' interest.

There has been a substantial increase in the MSPs of various crops over the last few years. This is considered necessary as incentives for farmers to increase production and productivity. At the same time, the MSP signals the floor price for the produce which, in turn, has the potential of increasing the prices. Addressing the welfare of the agricultural producers and of the consumers simultaneously poses a challenge. Further, inability of a large number of small and marginal farmers to directly access the agri-market puts a question mark on increases in MSP actually benefiting such farmers. Record procurement of rice and wheat in the last few years has helped to build up the buffer stock and strategic reserve of wheat and rice. There is, however, a huge cost involved in the process, which is met through budgetary sources in the form of food subsidies. The procurement operations linked with MSPs cause fiscal stress by way of increasing food subsidies. The issue of efficient food stocks management and offloading of stocks in time needs urgent attention.

** The author is Assistant Professor, PG & Research Department of Commerce, Gobi Arts & Science College, Gobi, TamilNadu, India, E-mail: mvm_gasc@rediffmail.com*

Promoting Sustainable Agriculture in India

By **Dr. D. Amutha**

The Agriculture sector, world over, has experienced a phenomenal growth since the mid-twentieth century. The growth, driven by Green Revolution technology, has made a significant dent on aggregate supply of food grains, ensuring food security to the growing population. The next stage of agricultural growth however, faces a serious challenge in terms of sustainability. Whereas the main problem faced by developing countries in the south pertains to sustainability of resource use, the main challenge facing the developed economies in the North is overuse of chemical inputs. Notwithstanding these limitations, policies in both the North as well as the South have led to increased emphasis on promoting sustainable agriculture.

India can safely be characterized as an agricultural country despite the recent spurt in manufacturing and services, and the declining share of agriculture in the national income, since majority of its workforce (65%) are still engaged in agriculture and allied activities. It is only relatively a recent phenomenon that large-scale forest areas, grazing lands and waste lands have been converted into croplands to support the rising population, which has caused ecological imbalance and atmospheric pollution. With no further scope for expansion of agricultural land, efforts have been made to enhance the production of food grains using high-yielding variety of seeds, fertilizers and irrigation along with advanced farm equipment. However, the so-called green revolution is confined to a few crops, viz, wheat, rice and maize, and has been possible only in restricted areas, i.e., Punjab, Haryana and Western Uttar Pradesh and certain selected districts of Andhra Pradesh, Maharashtra and Tamilnadu.

Need for Sustainable Agriculture

We can compare three broad types of farming: traditional production systems; conventional modern agriculture (such as Green Revolution technologies); and, sustainable agriculture. We can compare them across three dimensions: ecological, economic and social.

Ecological Sustainability: Many traditional and most conventional farm practices are not ecologically sustainable; they overuse natural resources, reducing soil fertility, causing soil erosion and contributing to global climatic change.

- **Soil Fertility:** A continuous fall in soil fertility is a major problem in many parts of India. Sustainable agriculture improves fertility and soil structure and prevents erosion.
- **Water:** Fertilizer and pesticides contaminate both surface and groundwater. Sustainable agriculture increases the organic matter content of the topsoil, so raising its ability to retain and store water that falls as rain.
- **Biodiversity:** Sustainable agricultural practices frequently involve mixed cropping. Thereby it increases diversity of crops produced, raise the diversity of insects, other animals and plants in and around fields.

- **Pollution:** Pesticides are hazardous to human health as well as to the local ecology. Incorrect handling, storage and use of pesticides lead to health and pollution problems. Sustainable agriculture reduces or eliminates the use of hazardous chemicals. Instead it controls pests with a variety of biological and agronomic measures and the use of natural substances.
- **Landscape:** Agriculture and forestry envelope the rural landscape. Inappropriate use causes erosion, landslides and flooding, clogs irrigation channels and reduces the ability of the land to support the local population. Impoverished rural people flock into cities in search of jobs, forming unsightly, unsanitary slums that further destroy the landscape. Rehabilitating ecologically damaged areas needs huge investments that few countries can afford. Sustainable agriculture avoids these problems by improving productivity, conserving the soil, avoiding the expansion of farming into unsuitable areas and preserving rural jobs.
- **Climate:** The way agriculture is practiced contributes significantly to global climatic changes. Conventional agriculture contributes to the production of greenhouse gases in various ways: by reducing the amount of carbon stored in the soil and in vegetation, through the production of methane in irrigated fields and through energy-intensive activities such as the production of artificial fertilizers. Adopting sustainable agriculture would reduce these impacts significantly.

Economic Sustainability: Agriculture cannot be sustainable unless it is economically viable over the long term. Conventional agriculture poses greater long-term economic risks than "sustainable" alternatives.

Export vs. Local Orientation: Governments tend to view export-oriented production systems as more important than those that supply domestic demands. This is misguided. Focusing on exports alone involves hidden costs – in transport, in assuring local food security, etc. Policies should treat domestic demand and in particular food security

(either by farmers producing food for themselves, or by selling produce for cash they can use to buy food) as equally important to the visible trade balance.

- **Debt:** The Green Revolution raised India's grain output significantly, but a vast number of small-scale farmers ran into a debt trap – they took out loans to raise their production and then found they could not pay the money back. About 40,000 were so desperate that they committed suicide.
- **Risk:** Concentrating on specific commodities seems to promise high economic returns. But market production implies certain risks – markets change quickly, and international agricultural prices are dropping. Cheap foreign food may sweep into the national market, leaving Indian farmers without a market. As a World Trade Organization signatory, the Indian government is under pressure to deregulate and open its economy to the world market so cannot protect its farmers behind tariff walls.
- **Niche Markets:** Organic agriculture is one of the strongest ways to farm in an environmentally sustainable way. The demand for certified organic products is increasing quickly, opening opportunities to expand sales of such products and to explore niche markets.
- **Employment:** Farming is the main source of employment for rural people. Trends towards specialization and mechanization may increase narrowly measured 'efficiency', but they reduce employment on the land. The welfare costs of unemployment must be taken into account when designing national agricultural support programmes. Sustainable agriculture, with its emphasis on small-scale, labour-intensive activities, helps overcome these problems.

Social Sustainability: The social sustainability of farming techniques is related to the ideas of social acceptability and justice.

- **Inclusiveness:** Development cannot be sustainable unless it reduces poverty for the broad masses of people in India. The government must find ways to enable the rural poor to benefit from agricultural development.
- **Political Unrest:** Gaps between the 'haves' and 'have-nots' feed a feeling of social injustice among those who feel neglected and excluded from development opportunities, as well as from better-off sympathisers.
- **Local Acceptance:** Many new technologies fail because they are based on practices or assumptions from outside. Sustainable agricultural practices usually are based on local social customs, traditions, norms and taboos, so local people are more

likely to accept them and adapt them to their own needs.

- **Indigenous Knowledge:** Sustainable agricultural practices often rely on traditional know-how and local innovation. Local people have a wealth of knowledge about their environment, crops and livestock. They keep locally adapted breeds and crop varieties. They have social structures that manage and conserve common resources, help people in need and maintain the social fabric. Rather than ignoring or replacing this knowledge, sustainable agricultural development seeks to build on it and enrich it with appropriate information from outside.
- **Gender:** In traditional agriculture, women traditionally bear the heaviest burdens in terms of labour. In modern conventional farming, too, men often benefit the most – they control what is grown and how the resulting income is spent. Sustainable agriculture attempts to ensure that the burdens and benefits are shared more equitably between men and women.
- **Food Security:** Traditional farming techniques often fail to produce enough food, or enough variety of food for a balanced diet. Conventional modern farming focuses on a few commodities, so people still do not have a balanced diet. Sustainable agriculture improves food security by improving the quality and nutritional value of the food and by producing a bigger range of produce throughout the year.
- **Participation:** Traditional society in India is characterised by wealth prejudice and caste distinctions. Introducing conventional farming innovations tends to exacerbate these: the rich and higher-caste tend to benefit, while the poor and lower-caste are left out. Sustainable agricultural interventions consciously target the less well-off, empower them so they can organize and speak with their own "voice" promoting dialogue and democracy.

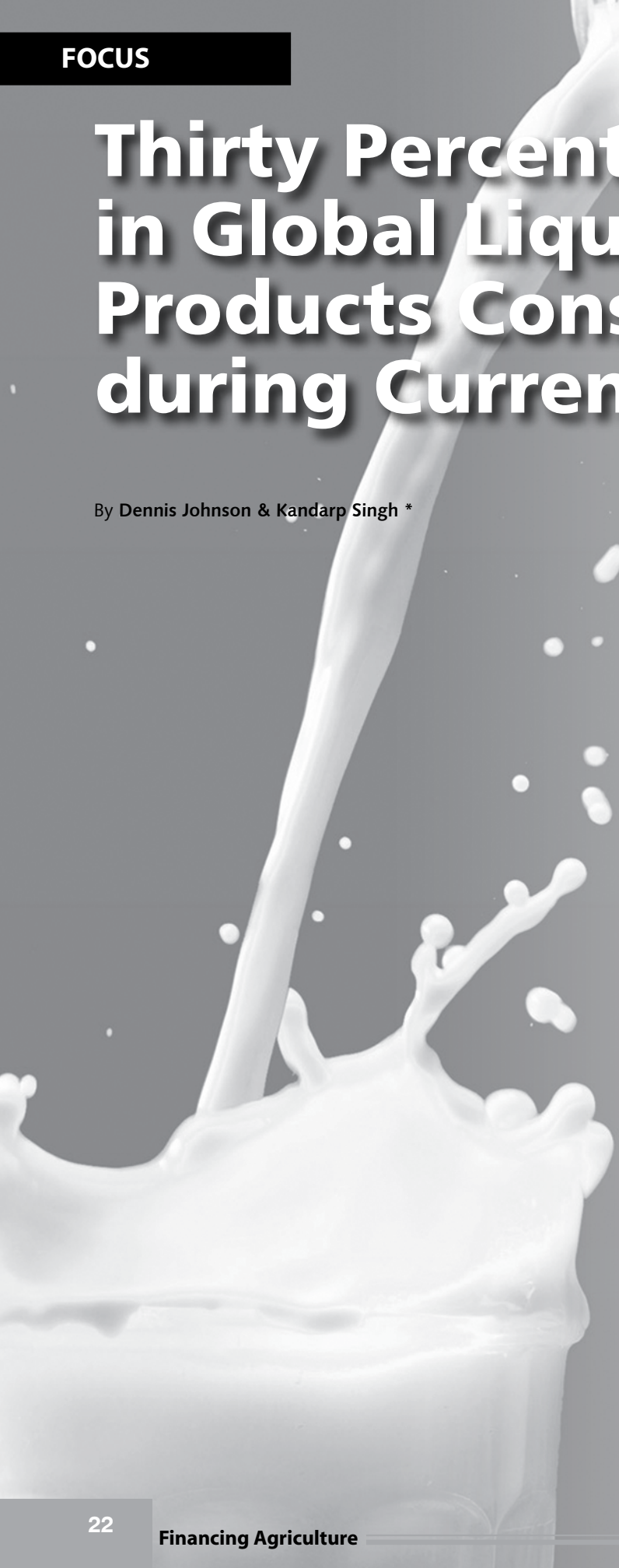
Sustainable Agriculture – Possible Actions in India

- Improvement of existing production systems (e.g. altered crop rotations, introduction of green manuring, use of plant species adapted to specific locations);
- Improved protection of natural resources (e.g. erosion protection);
- Increase in efficiency of existing resources (e.g. irrigation, use of technology, basic and advanced training);
- Introduction of regenerative branches of business (e.g. horticulture or aquaculture);
- Introduction of a new production element in existing enterprises (such as fruit trees to stabilize terraced fields, fish-farming in rice fields);
- Optimization of post-harvest systems (e.g. storage);
- Increase the value of agricultural products through further processing (e.g. production of yoghurt from milk);
- Improvement of channels of distribution (e.g. market access, transport);
- Access to loans and other financial services;
- Covering risk (e.g. through land law, support of producer groups).

** Asst. Professor in Economics, St. Mary's College (Autonomous) Tuticorin; amuthajoe@gmail.com*

Thirty Percent Surge in Global Liquid Dairy Products Consumption during Current Decade

By **Dennis Johnson & Kandarp Singh** *



Latest research from Tetra Pak, the world's leading food processing and packaging company, forecasts a rise of around 30 percent in global consumption of White milk and Other Liquid Dairy Products (OLDP) from 2010 to 2020. This consumption boom will be driven by economic growth, urbanisation and the rising purchasing power of Asia's middleclass, according to the fourth issue of the Tetra Pak Dairy Index, which tracks worldwide facts, figures and trends in the global dairy industry.

Demand for liquid dairy products (LDP) will rise in every region of the world between 2010 and 2020, with the exception of Western Europe, which has the world's highest per capita consumption of milk. The liquid dairy boom reflects a growing shift in economic power from West to East. An emerging middleclass is set to fuel demand for healthy, packaged products in supermarkets and convenience stores from Shanghai to Mumbai.

Global demand for white milk and OLDP – including flavoured milk, drinking yoghurt, sweetened condensed milk, lactic acid drinks and infant milk – is expected to grow to around 350 billion litres by 2020, compared with some 270 billion litres in 2010.

The emergence of a significant middleclass, urbanisation and the expansion of modern shopping habits by busy, health-conscious and well-informed consumers is raising the consumption of packaged milk in developing countries. Consumers of this decade are looking for greater convenience and uncompromising quality and safety.

India's dairy market is at a very exciting and interesting stage. With economic growth across a wider cross-section of consumers and one of the youngest populations in the world, India is witnessing a dramatic change when it comes to consumers' views on health, safety and convenience. This is evident with the shift from loose to packed milk. Long shelf-life milk packed in cartons and carton based pouches continues to see strong growth in its early stages of entry in the Indian market. We are certain this trend will only accelerate.

Economic growth and demographic changes are driving demand for all types of LDP in both developed and developing countries. Among the trends the report details are:

China and India driving the Dairy Boom: Continuing population growth in India, the world's largest consumer of milk, and the increasing popularity of milk and other liquid dairy products in China means that by the end of the decade, India and China are expected to account for more than a third of the world's total LDP consumption, with the Asia-Pacific region continuing to consume more than the rest of the world.

Shift from 'Loose' to Packaged Milk: The rising economic power of India and other Asian nations is expected to spur a shift from loose to packaged white milk consumption in these areas. Last year, around 51 percent of white milk consumed in developing countries was bought loose. Sales are forecast to reach a tipping point in 2014, with around 55 percent of white milk sold in packages, and this is expected to climb towards 70 percent by 2020.

Seeking Value in Mature Markets: Value-added products promoting convenience, health and well-being may offer the best growth opportunities this decade for the mature markets of Western Europe and North America. Whilst LDP consumption per capita in these regions is expected to fall, they are set to remain the top two LDP consumers per capita in 2020.

Focus on Efficiency and Sustainability

Major brands and retailers around the world are making ever-stronger commitments to reduce waste and lower carbon impact, a trend that will continue. For example, the US milk industry recently pledged to cut its carbon footprint by 25 percent by 2020. Tetra Pak recently announced it will cap carbon emissions at 2010 levels by the end of 2020, which translates into a 40 percent relative reduction in CO2 equivalent emissions.

Economic growth in emerging markets has lifted many millions out of poverty. They have more money, are better educated and have new aspirations. It is clear that meeting the world's growing thirst for milk will be both a challenge and an opportunity for dairy producers. We are convinced that the industry can realise these growth opportunities in a sustainable and innovative way, providing the healthy, nutritious and convenient products that people want.

The fourth Tetra Pak Dairy Index can be viewed in full at: www.tetrapak.com.

** Dennis Johnson is President and CEO, Tetra Pak; Kandarp Singh is Managing Director, Tetra Pak South Asia Markets*

The Challenge of Improving Health in India

Lecture by Professor Abhijit Banerjee, Massachusetts Institute of Technology Second in the NCAER Distinguished Lecture Series

Prof. Abhijit V. Banerjee, the Ford Foundation International Professor of Economics at the Massachusetts Institute of Technology (MIT) and co-founder of the Abdul Latif Jameel Poverty Action Lab (J-PAL) at MIT, recently delivered the second lecture in the Distinguished Lecture series at NCAER. Prof. Banerjee spoke about 'The Challenges of Improving Health in India'. Mr. Swaminathan Anklesaria Aiyar, Consulting Editor, The Economics Times, provided his comments after the Lecture.

Introducing the Lecture Series and Professor Banerjee, Dr. Shekhar Shah, the Director-General of NCAER, noted "the emphasis that NCAER increasingly places on sound, evidence-based policymaking and the role it plays with government and the private sector in providing the kind of field-based, analytical evidence that matters." He noted that the Distinguished Lecture Series was designed precisely to have scholars like Prof. Banerjee contribute to the policy debate around key issues such as health.

In a far reaching and impassioned talk, Prof. Banerjee spoke with great insight about the many challenges that remain unaddressed in improving health outcomes in India, particularly for poor people, children and mothers. The key message of the talk was that Indian policymakers should be paying much more attention to what works and what does not on the ground, and why, in seeking to meet the challenge of improving health outcomes in India. As Prof. Banerjee noted, "Evidence matters, and yet is often ignored in making and implementing policies." A significant proportion of the Indian population, especially poor women and children, suffer from easily preventable non-communicable diseases, childhood malnutrition, and lack of access to quality and affordable healthcare.

"There is a lot of talk now about the need to offer comprehensive health coverage for all Indians. However, this conversation seems to entirely ignore the large body of accumulated knowledge about the supply and demand for healthcare in India. This

knowledge makes it very clear that offering comprehensive health coverage will be an extraordinarily challenging proposition without substantial prior changes in the demand and the supply of healthcare, both requiring major reforms in policy, implementation, and the accountability of the healthcare giver," Prof. Banerjee said.

The NCAER talk took place against the backdrop of Prof. Banerjee's recently published book, 'Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty,' co-authored with Professor Esther Duflo, also at MIT and a co-founder of J-PAL. In that book, Banerjee and Duflo argue with great persuasion that while there are many grand generalizations about what is required for economic development, it is far more important to observe and experiment on the ground to learn how poor people actually cope with their poverty, what they know, what they seem (or don't seem) to want, what they expect of themselves and others, and how they make the choices they make.

On health, in his book as well as in his NCAER talk, Prof. Banerjee emphasized the many 'low-hanging fruits,' such as immunization, bed nets, oral rehydration, and food supplements like iodized salt and special weaning foods for infants could save many lives and vastly improve health outcomes for children, women, and poor people. Despite their low cost and easy availability, all too few people make use of such preventive technologies. In his talk, Banerjee gave his views on why this happens, and the priorities for improving health outcomes that this implies. The high absenteeism rates and low motivation of government health providers are two reasons why we do not see more preventive care being delivered. But rather than fix this problem first, health priorities in India seem to be turning to even tougher challenges of providing universal health coverage – a challenge that will be hard to meet on weak foundations.

Prof. Banerjee pointed out that the biggest challenge to improving health in India is the poor use of public resources and the poor regulation of treatment qualities. Households can spend their own money to look after their health or avail of government health services.

Unfortunately, for a variety of reasons that we need to understand better, people seem to be avoiding the free public health system. In recent years, at 71 percent of all health expenditures, India has one of the highest out-of-pocket private household expenditures on healthcare. This is unfortunately mostly spent on purchasing drugs that are then often used inappropriately, such as taking one or two antibiotic pills rather than completing the full recommended course.

One major problem in usage of government health system is huge demand for curative rather than preventive services. Other health-related financial burdens for poor people include the costs of foregone wages, transportation costs to inaccessible facilities, and the bribes to be paid to obtain services.

Often the solutions to improved health lie outside the health establishment. Reliable access to piped water, sanitation and appropriate nutrition can improve health dramatically, and at far less cost than universal curative health coverage. According to Banerjee, inexpensive prevention of diseases should always be the first step before a country can ensure the efficacy of expensive cures for all. The first goal of the healthcare policy in India should be to make preventive care easily available for the poor and enforce stringent regulation of the quality of treatment. While other objectives can be pursued and should be pursued, we should not let other concerns divert our attention from these fundamental goals.

Commenting on the lecture and the proposals for the right to health approaches, Mr. Aiyar noted that the need of the hour is to spend 'smartly' rather than spending 'more'. Given the lack of state capacity, it is better not to over burden it. He mentioned that it is the tasty packaging of the nutritious food that would matter to the poor rather than just the same morsel of bread everyday. He also pointed out that if we intend the beneficiary groups to act, then it is imperative for these groups to be empowered so that they are able to change the system.

About NCAER: NCAER, established in 1956, is an independent, non-profit policy research institute committed to assist government, civil society and the private sector in generating, implementing and evaluating informed, evidence-based policy and programme choices. It is India's oldest and one of its largest public policy research institutes. Its faculty undertake research studies at the request of government, industry, and corporate clients and pursue independent policy research on a number of priority themes. NCAER is particularly strong in the analysis and collection of large-scale data at the national, state, sector, industry, firm, and household levels. For more information, please visit www.ncaer.org.

Food Inflation - Challenges with Vast Opportunities

By **Rajendra Singh** *

Food inflation has been the most widely debated subject across the country in the last couple of years. As food inflation is directly related to agriculture, it would be appropriate to know its strengths and weaknesses.

To talk of strengths, we have the second largest cultivable land area in the world and the largest number of agro-climatic zones. According to estimates, almost 20 percent of the economically active population of the world is engaged in agriculture in India. India is ranked among the top three countries of the world in production of cereals, cotton, tea, sugarcane etc. Further, it has a vast network of good research institutions. Our farmers and policy makers have had credits of ushering in Green Revolution and White Revolution.

In the case of milk production, India leads with its annual milk production of 100 million tonnes. About 75 million women are involved in growing or collecting fodder and feed essential for dairy farming. If this is compared with the US, only one lakh farmers are involved in producing 70 million tonnes of milk.

Here, it should not be construed that 75 million women are to be displaced, but there is a need to improve productivity and profitability of the land through diversifying labour by bringing automation and technology upgradation.

So far as weaknesses are concerned, our Prime Minister Dr. Manmohan Singh has very rightly pointed out four major weaknesses – infrastructural, market economy, public investment/credit problems and knowledge deficit.

Public investment in agriculture has been in sharp focus from the 1st Five Year Plan (1952-57). However, it has gained momentum only during the last couple of years. This is true for irrigation and water management as about 57 percent of the agricultural land is still rainfed. Therefore, it is crystal clear that unless there is a long term investment in this sector, productivity and production will keep suffering.

Comparing our productivity with the world average, we find there is a wide gap. For example, in case of wheat it is 2.89 metric tonnes per hectare against world average of 3.01 metric tonnes while China's figure is 4.77 metric tonnes. Similar trend is available in case of rice where India's average is 3.18 metric tonnes against world and china's average of 4.25 and 6.59 metric tonnes respectively. In the case of coarse grains, situation is too grim where India's average is 1.38 metric tonnes against world average of 4.95 metric tonnes and

China's average of 3.59 metric tonnes on per hectare basis.

India wastes more fruits and vegetables than are consumed in the United Kingdom. The yield for most of the key agricultural products today is 20-40 percent of the world's best levels. For example, productivity of pepper in Kerala is 320 kg per hectare, while Vietnam, a smaller country than India, produces 1.2 tonnes per hectare. Similarly, India's coffee productivity is 765 kg per hectare, while Vietnam produces 1.7 tonnes per hectare.

The above figures clearly speak that the potential of these crops remain yet to be exploited with the use of high yielding varieties of seeds, improved package of practices and use of technology.

There are also sharp regional variations in the gap between the yield on the research farms vis-a-vis per hectare yield across the states. To cite some glaring examples of gap, in case of wheat it is 84 percent for Madhya Pradesh and for rice over 100 percent for Assam, Bihar, Chhattisgarh and Uttar Pradesh.

Thus, it offers scope for bridging the yield gaps by 50 percent provided we are able to plug the loopholes. Another a major obstacle is the infrastructure. The glaring deficit is the supply of cold chain for agricultural produce. To cite an example, if an exporter wants to export grapes to the Netherlands, the time taken is twice as compared to grapes coming from Chile to Netherlands although in our case the distance is just half. Therefore, the need of the hour is to swing into action to remove the bottlenecks and develop cold chain facilities across the country. This will help farmers to reap benefits by better price realizations.

There are also weaknesses in the post-harvest management and agricultural extension system providing scientific know-how of raising crops, its harvesting, processing, storage and marketing etc.

One of the major areas of weaknesses is the large number of small and marginal farmers whose land holding size is progressively under decline. Therefore, the long felt need is to make these holdings efficient, productive, sustainable and viable.

A major threat is looming large as to the outcome in the post-WTO scenario when the tariff and non-tariff protection to our farmers will no longer be available. This sends a clear message to our farmers to be ready to face the likely impact.

Another major problem is climate change and its impact on agriculture, particularly on small/marginal farmers as their capability to cope with these unforeseen calamities is limited. Climate change will have varied implications in terms of delayed/deficient rains, floods in different parts of the country and melting of glaciers etc.

The worst threat that agriculture is facing is large scale migration of rural youth to cities/towns leaving it to the old people. Further, due to unintended consequences of Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), a shortage of agricultural labourers is common in rural areas.

This has put the onus on women. This has also started increasing the workload on already overburdened women. On the other hand, according to a National Sample Survey Organization (NSSO) study, about 40 percent of the farmers do not want to continue farming and given a choice, they would go for some alternative livelihood option. Therefore,

there is a need to have the right type of manpower to manage agriculture in the villages.

High Food Prices – An Opportunity

Global agricultural markets saw strong price increases in the past few years as food demand has been growing in such emerging economies as China and India. The temporary tightening of supply is the result of a combination of factors – drought in producing areas, erratic rains in different parts, diversion of traditional food crops (grains, oilseeds and vegetables) for production of cash crops, bio-fuels and increased speculative activities like hoarding and black marketing. There is no doubt that these high food prices have surely hurt the consumers but farmers have indeed benefited. The rising inflation does provide an opportunity for further reform and importantly, much investment in the farm sector. If farmers are granted greater freedom to market signals, they can become more innovative and competitive in their farming. But this pre-supposes a vibrant market place both for inputs and outputs.

The present food inflation is not only an opportunity for the farmers but also rectifies the imbalance that has been developing in terms of trade between agriculture and industry.

So far as opportunities in agriculture are concerned, there are about 36 agro-climatic zones in the country. India is endowed with abundant resources, which, if judiciously utilized will not only feed our country but half of the world. There is a surging demand for food and feed and their prices are going to be sticky. This would provide the sustainable basis for a remunerative and viable agricultural sector. The rising demand for food is due to population pressure, rising income and changing lifestyles. Demand for non-vegetarian food is also increasing leading to more demand for more agricultural products in terms of feed.

It is an opportune time for Indian farmers to reap the benefits. On the other hand corporates and private sector players are keen to seize such opportunities. This shows tremendous opportunities for employment and income generation in agricultural business/agro industries and supply chain, if the capabilities of corporates can be harnessed judiciously. Indeed rural India needs massive private investment by building an agriculture industry interface.

Opportunity for Banks

As emphasized earlier, one of the weaknesses of Indian agriculture is its preponderance of small/marginal farmers with small landholdings which impact the productivity and efficiency of the sector.

But now the time has come when we have to use it as an opportunity. If banks can bring these farmers to the banking fold, the rural sector with increased income generation capabilities will provide them with a stable source of retail deposits. This segment should be provided with whole gamut of financial services like credit, both production and consumption, saving products and remittance facilities.

This is possible now if the innovative Banking Correspondent/Banking Facilitators models of delivery channels are optimally integrated with the

Contract farming may be a win-win situation for both the farmers and the corporate sector. It will generate gainful employment in rural communities and a steady source of income at the individual farmer's level with assured prices and markets

traditional brick and mortar branches. With information technology (IT) put in place and emerging information communication technology (ICT) solutions including the emerging possibilities in mobile phone-linked banking, transaction costs of providing near doorstop financial services to the rural population can come down significantly.

There is immense scope for bankers to enter allied activities. In the case of allied activities, vulnerability of the farmers to yield income fluctuations compared to financial assistance for crop production is mitigated providing a cushion to the farmers. In addition, allied activities provide an important source of supplementary income to small and marginal farmers, and women in the rural areas.

It may be worth mentioning here that India has one of the largest cattle populations in the world. The livestock sector contributes over 4 percent to the total GDP. Such allied activities linked with the cold chain can provide a daily cash flow to farmers.

Banks have gained experience in financing self help groups (SHGs) for micro credit. Now another area where they can make maximum contribution is the joint liability groups (JLGs). Through the group lending model of JLGs, risks can be mitigated to a significant extent.

Public Private Partnership Mode – Need of the Hour

Empirical evidence suggests that the next green revolution will be largely driven by the private sector. This will be primarily because they have the technology such as genetically modified seeds and nanotechnology that are required to bring in jump innovation in agriculture development. Further, many private companies have entered into agricultural development and provision of extension services. Thus there is a need to develop supportive policies that promote such initiatives by providing the right environment to facilitate PPP model.

It is in this context that one must examine the role of the corporate sector in ushering in another kind of revolution. There is a need for change in the mindset of farmers, policy makers, intermediaries in the agriculture process, and all other stakeholders for such a revolution.

Contract Farming – Driver for Second Green Revolution

These days there is demand for quality agricultural produce from the agro-based food industry. Timely and adequate quantities of inputs at the right prices have assumed critical importance.

Value addition in contract forming involves moving to a value delivery system. This will ensure that the corporate sector will build backward linkages between agricultural research and development with seed selection and variety evolution, and forward linkages between processors, marketers, retail chain, exporters and consumers.

Contract farming may be a win-win situation for both the farmers and the corporate sector. It will generate gainful employment in rural communities and a steady source of income at the individual farmer's level with assured prices and markets.

The seasonality associated with rural employment will be neutralized with round the year agriculture related activities, which in turn will reduce migration from rural to urban areas. The corporate sector will ensure that Indian farmers are exposed to world class technology. It will also ensure crop monitoring on a regular basis and free technical advice. Since the corporates that will invest in agriculture will largely consist of large retail chains, exporters or food processors, contract farming will ensure a dedicated supplier base for them which will be build on long-term commitments. Uninterrupted and regular flow of raw material and protection from fluctuations in market pricing will be some of the other benefits of contract farming.

** Rajendra Singh, Former Chief Manager Indian Overseas Bank, Lucknow*

Business Opportunities in Micro Irrigation System in India

Plastic Trend in Agriculture ...

Prabhu N. Chakrawal
Officer – PADC
Product Application & Development Centre (PADC), Indian Oil Corporation Ltd, Panipat, Haryana

Introduction

Micro irrigation is an approach to irrigation that keeps the water demand to a minimum through spray, mist, sprinkle or drip. The water discharge patterns differ because emission devices are designed for specific applications due to agronomic or horticultural requirements.

Drip Irrigation: It is the slow and regular application of water directly to the root zone of plants through a network of economically designed plastic pipes, mains, sub mains, laterals and low discharge emitters. Drip irrigation in particular allows farmers to increase their water efficiency up to 50 percent, while at the same time improving yields by 30 percent or more.

LLDPE drip laterals are placed along the rows of the crop on which emitters are connected directly to provide water to the roots.

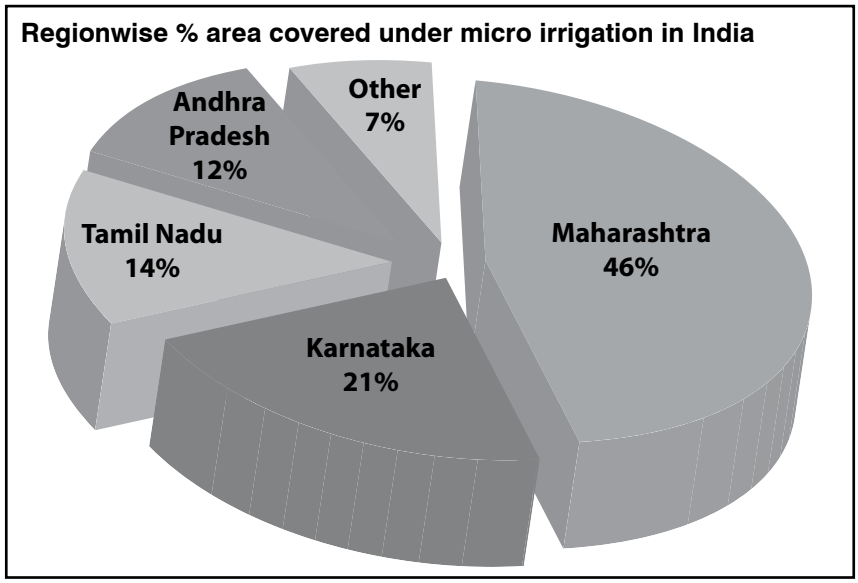
Sprinkler Irrigation: The water is conveyed under pressure through aluminium or high density polyethylene pipes to the fields. The water is sprinkled over the crop through the rotating nozzles at a pressure of 3-4 kg/cm2. The riser and nozzles are installed on the lateral pipes.

Potential of Micro Irrigation in India

India is a large producer of agricultural products. Irrigation resources are limited and the water use efficiency as well as agricultural productivity is low. Micro Irrigation has become popular in India and it has been adopted on 3.6 million ha. India has 172 million ha of cultivated land (second largest in the world). Studies of comparative crop yield and water use for surface and conventional drip irrigation of different crops carried out at agricultural universities in India have consistently found water savings of 30-60 percent and yield increases of 20-40 percent favouring drip irrigation over surface methods. There are some 100 private companies producing and

marketing drip irrigation systems in India. According to 10th Horticultural plan, out of the total cultivated area of 172 million ha in the country, only 65 million hectare (37%) is irrigated. As per the estimates, the total cropped area suitable for micro irrigation (Drip + Sprinkler) in the country is to the tune of 27 million ha. The Indian Committee on Irrigation and Drainage estimates a potential for drip irrigation in India of 10.5 million hectares.

The Micro Irrigation System (MIS) market in India was valued at Rs 17 bn in 2009 and is expected to grow rapidly in the future. The depleting water level and water scarcity has created a demand for Micro Irrigation System, which is expected to drive the market. Domestic and foreign participation has been continuously increasing as they compete for a sizeable share of un-irrigated land in India with high profit opportunities.



Reference: GOI 11th Five year Plan (2007-12)

India is a large producer of agricultural products. Irrigation resources are limited and the water use efficiency as well as agricultural productivity is low. Micro Irrigation has become popular in India and it has been adopted on 3.6 million ha. India has 172 million ha of cultivated land (second largest in the world)

Government of India Assistance & Plans

Drip Irrigation in India is promoted under the Government sponsored scheme "CSSMI (Centrally Sponsored Scheme – Micro Irrigation)".

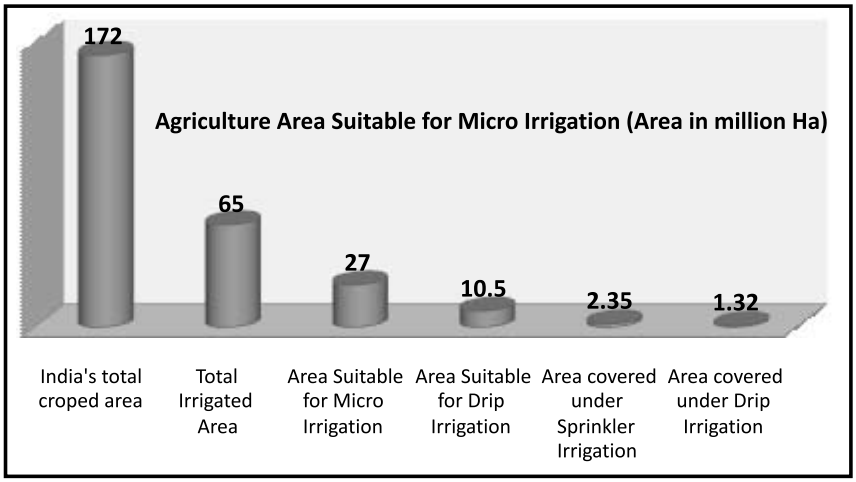
Central government is giving 40 percent subsidy and 10 percent subsidy is given by state government remaining 50 percent cost is borne by the beneficiary (farmers), a maximum area of five ha per beneficiary.

Additional subsidy is also given by some government bodies like NABARD, which vary from state to state.

Different State Governments were found to have supplemented the central subsidy fund with their own resources and improved the scope & coverage of the micro irrigation scheme.

In foreign lands 15 percent of plastics are used in agriculture. In India, we are using only 3 percent in Canal lining and drip irrigation. In Agricultural plastic uses are endless.

In India, adoption of micro irrigation is growing with annual average growth rate of 16-17 percent.



(Ref: Book: Micro Irrigation System in India 2010)

Particulars	AP	Gujarat	MP	Karnataka	Orissa	Punjab
Total Assistance (% of total system cost)	70%	50%	70%	75%	70%	75%
% Shares – Central: State: Beneficiary	40: 30: 30	40: 10: 50	40: 30: 30	40: 35: 25	40 : 30: 30	40: 35: 25

Since plenty of water resources are available in northern India, the farmers have not adopted for micro irrigation. But farmers have started adopting micro irrigation in northern regions like Bundelkhand region, Himachal Pradesh and in the border regions of Haryana, Rajasthan and Punjab because of scarcity of water.

Government has allotted Rs 10 bn for micro irrigation in the union budget 10-11.

The significant hike in the planned outlay for the agriculture and allied sector as compared to the previous fiscal is indicative of the Government's thrust towards increasing the production and productivity of the agricultural sector. The allocation of micro irrigation projects also augurs well for the overall agricultural growth going forward as this would help in reducing its dependence on monsoons.

(Ref: Union Budget 2010-11 – Impact Analysis)

In the 11th Five Year Plan (2007-2012), the government approved a rehabilitation package amounting to 16,978 crores for farmers in distress in 31 selected districts in the four States, namely, Andhra Pradesh, Karnataka, Kerala and Maharashtra. The package provides relief from the Prime Minister's Relief Fund, strengthening institutional credit support, irrigation development, promotion of micro irrigation, watershed development, extension services, enhancing seed replacement rate (SRR) and income augmentation through horticulture, livestock and fishery in these districts.

(Ref: 11th Five year plan –Volume III- Govt. of India)

In Uttar Pradesh, Government is giving 100 percent subsidy on drip and sprinkler irrigation in Bundelkhand region and 75 percent in the rest of the state. Bundelkhand region, which contributes maximum area in pulses, the facility of micro irrigation system has been extended in a big way.

Under National Horticulture Mission, the Haryana Government proposed a 1295 lakh budget for Micro Irrigation.

The Andhra Pradesh government has prepared a comprehensive action plan involving an outlay of Rs. 15,300 crore for execution of micro irrigation systems under the 31 lift irrigation projects in the state. Tenders for the projects, initially for an extent of 2,50,000 acres, were finalised in September 2010. By 2014, it has been targeted to cover the entire area of 6.2 million acres, which would be irrigated by the 31 lift irrigation projects. The implementing agencies will maintain the micro irrigation systems for a period of five years.

(www.ibef.org : News: AP to take up Rs 15300 cr micro irrigation projects)

Bihar State has planned to bring an area of 200000 ha under drip and sprinkle irrigation systems covering 534 blocks in 38 districts involving a total project cost of ₹ 708 crores.

Haryana State Micro Irrigation Action Plan – 2009 -10

S.No.	Component	Horticultural Crops		Non Horticulture Crops	
		Phy.(ha)	Fin. (Rs. in lakhs)	Phy.(ha)	Fin. (Rs. in lakhs)
1	Drip Irrigation	3459	1066.40	120	71.85
2	Sprinkler irrigation	586	79.46	0.00	0.00
	Total	4045	1223.56	120	71.85

(Ref: Presentation: Haryana Agriculture Strategy, Dept of Agri. Haryana)

Subsidy by the Central & State Government in Bihar

General Farmers (Small/ Marginal/ SC/ ST/ Women): 70%

Maximum amount of subsidy to be paid to a farmer, as under -

Area Planned Under Different Sectors: (Drip Irrigation Systems) – Bihar State (Amount: Rs. In Lakhs)
(For the year 2009-12)

Drip Irrigation System	Area (Ha)	Estimated Cost per ha	Total Estimated Cost	Subsidy				Farmer's Share
				GOI Share (40%)	State Share (20%)	Additional State Share (10%)	Total	
Mango, Litchi, Guava	80000	0.35	28000	11200	5600	2800	19600	8400
Banana	8000	0.90	7200	2880	1440	720	5040	2160
Vegetables	10000	1.30	13000	5200	2600	1300	9100	3900
Sugarcane	1500	0.90	1350	540	270	135	945	405
Flower Culture	500	1.40	700	280	140	70	490	210
Total	100000		50250	20100	10050	5025	35175	15075

Area planned Under Sprinkler/Rain Gun/Rain Pot Irrigation System – Bihar State (Amount: Rs. In Lakhs)

Sprinkler/ rain pot/ rain gun	Area (Ha)	Estimated Cost per ha	Total Estimated Cost	Subsidy				Farmer's Share
				GOI Share (40%)	State Share (20%)	Additional State Share (10%)	Total	
Vegetables	4000	0.35	1400	560	280	140	980	420
Potato	10000	0.35	3500	1400	700	350	2450	1050
Sugarcane	1000	0.35	350	140	70	35	245	105
Agricultural crops	85000	0.18	15300	6120	3060	1530	10710	4590
Total	100000		20550	8220	4110	2055	14385	6165

(Reference: Presentation - State Action Plan for the year 2009-12, Department of Agriculture, Gov. of Bihar)

Sprinkler Irrigation System: Max area of 5 ha and financial assistance of up to Rs. 50,000.00

Drip Irrigation and Micro Sprinklers: Max area of 4 ha or Rs. 2,00,000.00

In case the farmer installs both sprinkler and drip irrigation systems at his farm the maximim amount of subsidy should be Rs. 2,50,000 subject to area limits prescribed above.

New Entrepreneur Development, Indian Oil Corporation Ltd,

Product Application & Development Center (PADC)

Technical support is given by the PADC to the interested Entrepreneur for setting-up of MI system manufacturing unit from project startup stage to the implementation stage in the following areas:

- Selection of Equipment
- Processing of IOCL grades to get the right quality of end product
- Development of cost effective recipe
- Information on recent development and market trends.

Micro Irrigation (MI) System Manufacturing Process: Drip Lateral is extruded from virgin LLDPE through a circular die (die range 12 - 32 mm). This resin is incorporated with Carbon Black for UV resistance to yield Lateral having excellent physical and environmental stress crack resistant properties. Drippers, the core of the drip irrigation system, are small water emitters made of injection moulded HDPE material. Depending upon the design it emits water of different flow rate (0.5 to 12 litre/hr). Drippers are inserted inside the lateral tube during the extrusion in In-line drip laterals. In off-line laterals, drippers are inserted from outside. Sprinkler pipe is extruded from virgin HDPE resin through a circular die (die range 32 - 110 mm) and Carbon Black is incorporated into the resin for UV resistance. Water sprinkler systems are mounted on the sprinkler pipe depending on irrigation application.

IOCL Grades for Micro Irrigation System

Application	Product	Grade	MFI (I2)	Density	Special Characteristics
Drip Laterals	LLDPE	010F18A	0.9	0.918	Good processability, Good mechanical properties, No slip and anti block.
	HDPE	003F46	0.30	0.946	Good Processability & low gel content.
Sprinkler System	HDPE	004P41	0.38	0.941	Very good processability, excellent ESCR. Meets PE-63 requirements
	HDPE	010DP45	1.0 (I5)	0.945	Bimodal grade with good processability. Meets PE-63 requirements
	HDPE	004DP44	0.43 (I5)	0.944	Bimodal grade with very good processability,
					Meets PE-80 rating requirements.
Dripper	HDPE	180M50	18	0.950	Excellent flow properties, very good processability, Excellent gloss.

Conclusion

The annual food grain requirement of India, works-out to be 450 million tons by the year 2050, in terms of average utilisable water resources, which was 6008 m3 in 1947 (presently 1250 m3) is expected to dwindle down to 760 m3 by 2050. Agriculture, a mainstay in India, has dependence of 65 percent of Indian population. The agricultural sector is the largest consumer of water. India shares 17 percent of the global population with only 2.4 percent of land and 4 percent of the water resources. Efficient utilization of available water resources may become crucial for the country. The overall efficiency of the flood irrigation system ranges between 25 to 40 percent. To meet the food security, income and nutritional needs of the projected population in 2020 food production in India will have to be almost doubled. Adoption of micro irrigation, may help in saving significant amounts of water and increase the quality and quantity of agriculture produce. All these emphasize the need for water conservation and improvement in water-use efficiency systems in agriculture through micro irrigation.

These lessons indicate that there is a high market potential of micro irrigation systems in the country. This business involves low projects investments which make it possible for entrepreneurs to start manufacturing businesses of micro irrigation systems in a small way.

References:

www.ncpahindia.com

www.icid.org

www.aphorticulture.com

www.ggrc.co.in

www.nhm.nic.in

www.planningcommission.nic.in

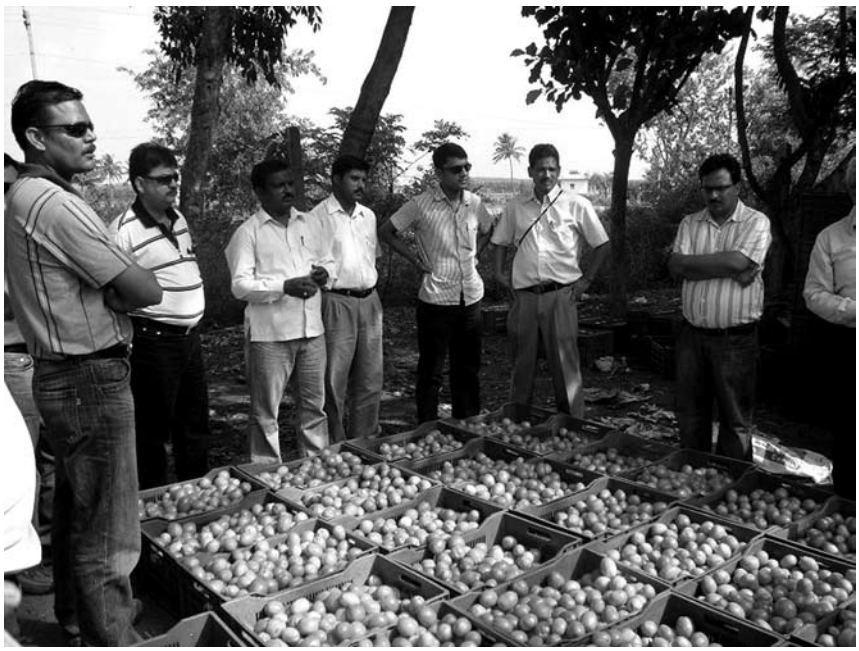
www.agricoop.nic.in

Book: Micro Irrigation System in India 2010

Rural Marketing Competitive Strategies

By **Dr. K.T. Chandy** *

Marketing is the pivot of economic development in rural areas. It is an essential component in income and employment generation in farm and non-farm sectors. Since marketing is one of the prerequisites for income generation, this article attempts to throw some light on both marketing of rural produce to other areas and improving marketing environment within the rural areas.



Introduction

Broadly, rural marketing incorporates the marketing of agricultural products, rural industries products and services of many kinds. The trade channels for different types of commodities available in rural areas, cooperatives, processors, regulated markets and state agencies. In no sense, a social cluster or village economy as a whole can be developed without effective and efficient rural marketing. Very little attention has been paid in the planning era towards the development of rural marketing. In fact, marketing is a dynamic state of affairs and is a part and parcel of the whole economy. Thus, production and marketing are the two facets of a coin. Rural marketing constitutes the nerve centre of rural development activities.

Rural marketing is a two-way process. The content now encompasses not only marketing of products that flow to rural areas, but also products that flow to urban areas from rural areas. In addition, it also includes marketing in the rural areas.

Marketing of Rural Produce to Other Areas

The rapid economic growth of any developing country is mainly governed by three factors: increasing food production and other major inputs of industry; increasing the income levels of middle and lower strata of the population; and most importantly, provision of basic infrastructure and planning a national marketing system and thereby increasing the size of the national market is also essential to integrate the marketing systems with the needs and wants of the consumer with available resources. This is the hallmark of economic development.

As India's major population lives in rural areas and agriculture being their main livelihood, major emphasis has been given to agriculture sector.

Strategies for Improving Marketing within Rural Areas

Considering the environment in which the rural market operates and other related problems, it is possible to evolve effective strategies for rural marketing. The strategies discussed here, though not universally applicable, depend upon product characteristics, the targeted segment of the rural market, the choice of the rural area and its economic condition.

Some of the typical characteristics which will help in rural market segmentation are land holding patterns, irrigation facilities, progressiveness of farmers, cropping pattern; mix of enterprise, education levels, proximity to cities/towns, sociological factors, and occupation categories. The small and marginal farmers, agricultural labourers and artisans form the largest segment in rural market (about two thirds), whereas rich farmers constitute about one third of the rural market.

An appropriate segmentation of the highly heterogeneous rural market and identification of the needs and works of different segments will form the very basis for rural market strategies.

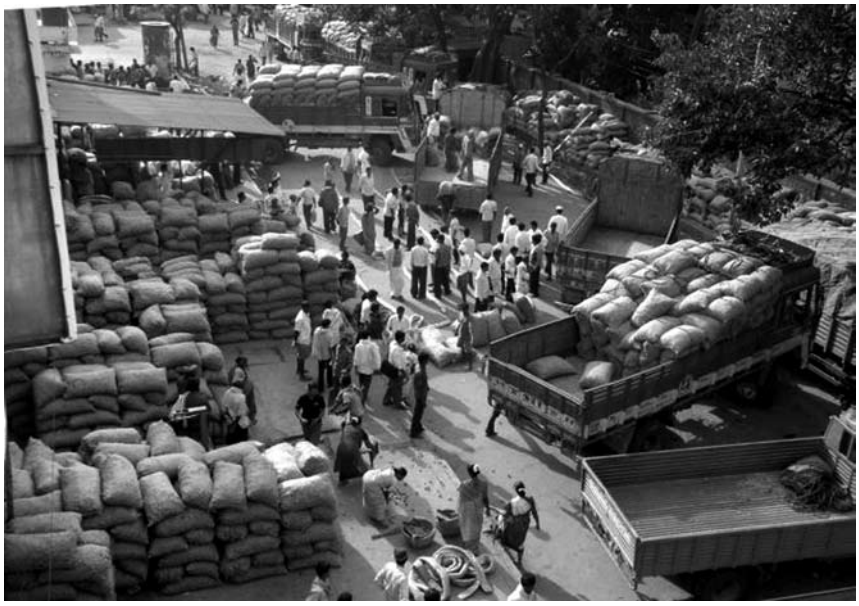
For the rural market, it will be ideal to think of strategies from the marketing

mix point of view, main strategies are related to product, price, place and promotion which are described as follows:

- **Product Strategies**
  - ❖ **Small Unit and Low Priced Packing:** Larger pack sizes are out of reach for rural consumers because of their price and usage habits. This method has been tested by other products like shampoos, biscuits, pickles, Vicks five gram tins, etc. In the strategy of keeping the low priced packed the objective is to keep the price low so that the entire rural community can try. This may not be possible in all types of products, but wherever this can be resorted to, the market is bound to expand.
  - ❖ **New Product Designs:** A close observation of rural household items indicates the importance of redesigning or modifying the products. The manufacturing and marketing men can think in terms of new product designs specially meant for rural areas keeping their lifestyles in view.
  - ❖ **Sturdy Products:** Sturdiness of a product either in terms of weight or appearance is an important fact for rural consumers. The product meant for rural areas should be sturdy enough to stand rough handling and storage. People in rural areas like bright flashy colours such as red, blue, green etc., and feel that products with such colours are sturdy but they are also more concerned with the utility of the item.
  - ❖ **Brand Name:** Rural consumers are more concerned with the utility of the products. Brand name awareness in the rural areas is fairly high. A brand name and/or logo are very essential for rural consumers for it can be easily remembered.
- **Pricing Strategies:** Pricing strategies are very much linked to product strategies. Some of these strategies are mentioned hereunder.
  - ❖ **Low Cost/Cheap Products:** This is a common strategy being adopted widely by many manufacturing and marketing men. Price can be kept low by small unit packaging.
  - ❖ **Avoid Sophisticated Packing:** Simple packageing can be adopted which can bring down the cost as it is presently being done in the case of biscuits. Some innovation in packing technology is very necessary for rural markets.
  - ❖ **Refill Packs/Reusable Packaging:** Such measures have a significant impact on the rural market. By such technology also the price can be reduced. In addition the packaging material used should preferably lend itself for reuse in rural areas. An ideal example in this direction can be the packing of fertilizers. Now companies have started packing fertilizers in LDPE or HDPE sacks, which are not only tamper proof but also reusable.
  - ❖ **Application of Value Engineering:** This is a technique which can be tried to evolve cheaper products by substituting the costly raw material with the cheaper one, without sacrificing the quality or functional efficiency of the product; for example in the food industry, soya protein is being used instead of milk protein. Milk protein is expensive while soya protein is cheaper but the nutrition value is the same. This technique yields itself for application in many engineering or product designed areas so that the price can be kept at an affordable level. These areas have to be explored by manufacturing and marketing men in the context of rural markets.

  The pricing strategy for rural market will depend upon the scope for reducing the price of the product to suit rural incomes and at the same time not compromising with the utility and sturdiness of the product.
- Distribution Strategies: Most manufacturers and marketing men do have a distribution arrangement for a village with a population of at least 5000 people. While it is essential to formulate specific strategies for distribution in rural areas, the characteristics of the product, its shelf life and other factors have to be kept in mind. Distribution strategies that are specifically designed for rural areas are through cooperative societies, public distribution systems, multi-purpose distribution centres, distribution up to feeder markets/mandi, towns shanties/ hat/jathras/melas, agricultural input dealers etc.

  Experience has shown that cooperatives have played a useful role in improving the marketing services in the regulated markets. The Gujarat Cotton Cooperative Marketing Societies set a good example of vertically integrated markets. The cooperative marketing institutions have to introduce scale economies in



their marketing operation and provide efficient and comparable services to the customers in competition with the private trade. Cooperative institutions would do better if the state level marketing federations enter into multilevel activities to improve the turnover of their business. The non-governmental organizations can anchor a key role in convincing the rural people to form into cooperatives highlighting the possible benefits without being exploited.

- Promotion Strategies: Mass media is a powerful medium of communication. It could be television, cinema, print media, radio and so on. The other means of mass media available are hoardings/wall paintings, shanties/ hats/melas, non-price competition, special campaigns etc. Besides these, there other forms of mass media like hand bills and booklets, posters, stickers, banners of the schemes etc. For disseminating the information, related to agricultural and other rural industries products, the government should circulate pamphlets either to panchayati raj office or to schools they it can be documented for reference.

Impact of Globalization: Contract Marketing

The macro level changes due to the New Economic Policy have had a direct impact in the field of agricultural marketing. As a result of globalization, substantial investments in new ventures are being made by national as well as international corporations. A number of foreign companies are slated to enter the Indian market through collaborations with the well known Indian companies like Eagle Agrofarms, Maxworth Orchards, etc. It is clear that the wholesaler in the fresh products market as well as the processor will prefer contract marketing tie-ups with the farmers for sourcing his supply requirements.

The potential benefits of the contract farming are that producers can reduce the market risk, post harvest losses can be reduced, technology can be transferred to the producers, contract serve as a security for increased access to credit by both producers and processors, and contracts may create a greater sense of common interest among the producers and induce greater involvement in group activities etc.

Major Areas of Concern in the Rural Marketing Sector

- Government should assume a more dynamic role in the field of agricultural marketing that of a strong buffer between global forces and local needs.
- Emphasize value addition by giving a thrust to agro-processing industries at the farm level so that the benefit of value addition is transferred to the producer.
- There is a need for professionalizing agricultural marketing as a subject of great practical application.
- Creation of an effective market intelligence network, right from the importer in the global market to the producer in the remote corner of the rural India.
- Institutional linkages should be emphasized upon to integrate the markets, for easy movement of goods and also to facilitate the inter-state trade.
- Regular surveys and analytical studies on agricultural marketing should be conducted for appropriate policy adjustments and refinements whenever necessary.
- Decentralization in the marketing system.
- To introduce social marketing for bringing about a change in the behaviour and attitude through social advertising and social communication. Some fertilizer companies and commercial banks are taking up Village Adoption Programme under social marketing.
- A design framework for information technology based Agricultural Marketing Network is essential. Computer installations at State as well as district marketing boards enhance the availability of trade information.
- Economic incentives should be offered to the farmers to encourage them during low economic conditions.

Conclusion

The most glaring deficiency in the rural economy is evident in giving the farmers a better deal in terms of institutional and advisory services and practical training. Intensive efforts to provide these basic facilities are the need of the hour. The Indian agricultural marketing system should be made much more competitive by infusing competition within the country and preventing the external system equation from interfering with the local markets in the larger interests of the nation.

** Agricultural & Environmental Education Specialist*

जैविक खेतीः उपाय एक–समाधान अनेक

(जैविक विधि द्वारा खेती)

आज से कुछ वर्षों पूर्व कृषि वैज्ञानिकों की रासायनिक खादों के प्रति दी गयी चेतावनी का भयावह सच, धीरे–धीरे हमारे सामने आता जा रहा है। हरित क्रान्ति के समय से, हमारे देश में खाद्यान्न की उपज बढ़ाने के लिए रासायनिक खादों का अन्धाधुन्ध प्रयोग किया जा रहा है, जिसके कारण एक ओर तो खेती के उपयोग में आने वाली भूमि की ऊपरी परत दिनोंदिन खराब होती जा रही है तो दूसरी ओर भूमि की जल धारण क्षमता भी कम होती जा रही है।

कृषि क्षेत्र की भूमि पर शोध करने वाले वैज्ञानिकों के अनुसार भूमि में रासायनिक खादों के प्रयोग से भूमि में नाइट्रोजन, फास्फोरस, पोटेशियम, सल्फर, जिंक तथा मोलिब्डिनम की मात्रा दिनोंदिन कम होती जा रही है तथा भूमि के क्षारीयता भी बढ़ती जा रही है।

किसान आज भी अपनी भूमि की उर्वरकों की आवश्यकता का आकलन किये बिना अधिक उत्पादन पाने के लिए रासायनिक खादों का अधिकतम प्रयोग कर रहे हैं, जिसके कारण उत्पादन तो अधिक नहीं हो पा रहा है परन्तु भूमि की उर्वरा शक्ति अवश्य नष्ट हो रही है तथा उत्पादन लागत बढ़ रही है।

रासायनिक खादों के प्रयोग से खेतों की जल ग्रहण क्षमता भी बुरी तरह प्रभावित हो रही है, जिसके कारण जहाँ पहले जिन फसलों में एक सिंचाई से काम चल जाता था, वहाँ अब दो बार सिंचाई करनी पड़ती है तथा सिंचाई का समय भी पहले से बढ़ गया है। एक अनुमान के अनुसार पहले एक एकड़ खेत की सिंचाई में 5–6 घण्टे का समय लगता था अब 18–20 घण्टे का समय लगता है तथा भूगर्भ जल भी विषाक्त होता जा रहा है।

यद्यपि रासायनिक खादों के प्रयोग से भूमि को काफी हद तक नुकसान पहुँच चुका है परन्तु हमारे पास अभी भी समय है तथा हम अपनी परम्परागत भूमि–पोषण करने वाली जैविक खेती तथा उपयुक्त फसल–चक्र को अपना कर अपनी कृषि योग्य भूमि को बचा सकते हैं। जैविक खेती के अन्तर्गत कम्पोस्ट, वर्मी कल्चर, गोबर की खाद, केचुए की खाद आदि का प्रयोग करके भूमि की उर्वरा शक्ति को पुनः प्राप्त किया जा सकता है। इन खादों में विद्यमान नाइट्रोजन तथा कार्बन भूमि में लम्बे समय तक बने रहते हैं तथा भूमि का पी.एच. मान भी स्थिर हो जाता है।

जैविक खेती के साथ फसल–चक्र को अपनाने से भूमि में लाभदायक सूक्ष्म जीवों का पोषण, खरपतवार की समस्या में कमी तथा भूमि की जल धारण क्षमता में वृद्धि होती है। फसल चक्र के अन्तर्गत फसलों को अदल–बदल कर उगाया जाता है, जैसे कि अधिक खाद चाहने वाली फसल के बाद कम खाद चाहने वाली फसल को उगाना, अधिक पानी चाहने वाली फसल के बाद कम पानी चाहने वाली फसल को उगाना इत्यादि। फसल चक्र के कारण भूमि में विषाक्त पदार्थ एकत्र नहीं हो पाते हैं तथा उर्वरक अवशेषों का भी पूर्ण उपयोग हो जाता है।

यहाँ एक बात और उल्लेखनीय है कि आज का किसान अज्ञानतावश भूमि की उर्वरा शक्ति नष्ट करने का एक और कार्य कर रहा है। किसान मेहनत से बचने के लिए कटाई के बाद बचे हुए डण्ठलों को साफ करने के लिए, उसमें आग लगाकर खत्म कर रहा है, जिसके कारण भूमि की उर्वरा शक्ति के लिए सर्वाधिक उपयोगी नाइट्रोजन को नुकसान पहुँच रहा है तथा साथ ही मित्र कीटों का भी जलकर नाश हो रहा है। यदि यह क्रम नहीं रुका तो भूमि को बंजर होने से बचाना सम्भव नहीं हो पायेगा। किसानों के मध्य यह प्रचार करने की आवश्यकता है कि वे डण्ठलों में आग नहीं लगाये बल्कि इन्हें जुताई कर मिट्टी में सड़ने के लिए छोड़ दें।

अन्त में, यह कहा जा सकता है कि जैविक खेती अपनाने से भूमि की उर्वरा शक्ति का संरक्षण, उत्पादन की गुणवत्ता में वृद्धि, उत्पादन लागत में कमी तथा भूगर्भ जल स्तर में वृद्धि हो सकती है। जिसके कारण कई समस्याओं का समाधान हो सकता है।

– डी.एस. वैद्यपरियोजना अधिकारी, कृषि वित्त निगम, बी•डी•एल•ओ• झाँसी; उ•प्र• मोबाईल नम्बर 9935826111

Remembering the Man who 'Made it Happen'

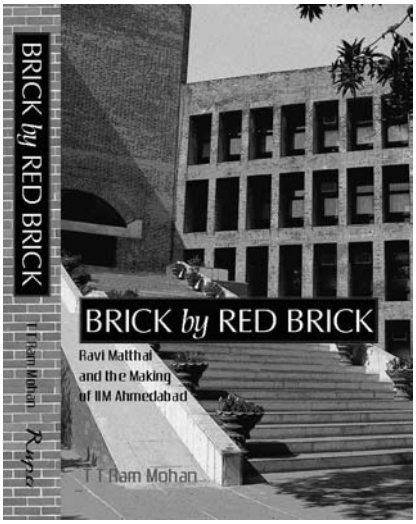
Brick by Red Brick – Ravi Matthai and the Making of IIM Ahmedabad

By **T.T. Ram Mohan**

In the genre of biographies, T T Ram Mohan's 'Brick by Red Brick' is a double treat. The dual journeys of the Indian Institute of Management at Ahmedabad (IIMA), arguably the country's finest management school, and the person who was largely instrumental in steering it on to the path of glory, Ravi Matthai, an institution-builder par excellence, have been traced with precision, candour and rare insight that long after the last page has been turned, the memory both of the creator and his labour of love lingers on. Since its foundation 50 years ago, IIMA has undoubtedly reached lofty heights.

For the academics and students of today, IIMA has come to symbolise excellence in education. But few of us may be aware of the fascinating history of this premier institute. And even fewer may have heard of Ravi Matthai who almost single-handedly ensured that IIMA reached the towering heights it has to be counted among the foremost educational institutions in the country today.

A graduate of IIT Bombay and IIMC, with a doctorate from the Stern School of Business, New York, author of this un-put-down-able book, T.T. Ram Mohan is himself a faculty of IIMA. Despite this, he confesses that though he had "heard of Matthai when I joined the Institute (IIMA) in late 1998 but did not know him then." However, in the first couple of years at the IIMA, Mohan noticed that "many important processes or initiatives in the institute were traced back to Matthai's time. These early impressions—of a larger-than-life figure—stayed with me. One day, I stumbled upon a collection of Matthai's speeches and writings. Going through the papers, I was struck by the quality of his writings. It was evident that this was a man who had thought



through the IIMA experiment with great care." An article on, Matthai written for an economic daily, evoked tremendous response from readers, which is when the idea of writing a book on him took seed.

A meticulous research on Matthai and those who knew him or had worked closely with him during his stint at the helm of IIMA provided Mohan with a wealth of information. Drawing on his insider's insight into the functioning of IIMA, Mohan has managed to lucidly bring out the strengths and weaknesses of IIMA in particular and other institutions like the IIMs and IITs in general.

Though the canvass on which he has chosen to etch the history of IIMA and Matthai is vast, Mohan has been able to straddle both remarkably well. Although at times his treatise on what ails management education does tend to get rather ponderous and repetitive. However, he has achieved to weave together the institute and the institution-builder with deft master-strokes.

An outsider to the rarefied world of academicians and a virtual novice in the arena of higher education with no qualifications or impressive degrees, Matthai, though the progeny of independent India's second finance minister, Dr John Matthai, was a plain graduate albeit from Oxford University. Originally a student enrolled for a masters programme at Allahabad University, then hailed as the Oxford of the East, he was unceremoniously bundled off to the original following an accident in which an inebriated Matthai mowed down a pedestrian. Instead of fleeing the upright young man put the body in his car and drove straight to the nearest police station to surrender himself. A police case was registered against him and when the then PM Jawaharlal Nehru refused to bend rules for his finance minister's son, it was his home minister Sardar Vallabhbhai Patel who suggested that the lad be packed off to England.

After graduating from Oxford, which, by his own confession years later, he "was very reluctant to leave because I did not see working for living as fun," Matthai did brief stints in the corporate world, ending up as the CEO of a company before giving it all up for a job with the IIMC. Matthai's transition from an "upper middle-class background, elite schools, Oxford, a well-heeled executive at a British firm" to an institution builder has been detailed brilliantly, illustrated with anecdotes provided by those who were closely associated with him.

Interestingly, when Vikram Sarabhai, one of the luminaries who was instrumental in setting up the IIMA in close coordination with management guru Prakash Tandon, industrialist Kasturbhai Lalbhai and academician Kamla Chowdhry, announced the appointment of Ravi Matthai as the first full-time director of

IIMA, there was bewilderment in the IIMA community as no one had heard the name of the 38-year old who was clearly too under-aged and under-qualified for a position of such import. Though the self-deprecatory Matthai maintained that "when they got to me, they had run out of all viable names," Mohan argues that "Sarabhai was far too clear-headed, too good a judge of men, too competent an institution builder and far too committed to IIMA to have settled on Matthai simply out of desperation." A write-up on Matthai in a special edition of an in-house journal of IIMA also gave an inkling of what might have transpired. "With his uncanny sense to judge the hidden value of people, Sarabhai was struck by the clarity of Ravi's thinking and articulation and also his ability to relate himself with his colleagues and associates. Tandon shared Sarabhai's judgement about the young professor."

In the course of chapters like 'Erecting the Edifice', 'Towering Over the Rest', and 'Light and Shadow', Mohan delves into the reasons why IIMA forged head and shoulders ahead of all other management schools; thanks to the processes and initiatives Matthai put in place. The author maintains that "the work atmosphere itself is extremely relaxed with no insistence on working hours." Embroidering it with an anecdote, he reveals, "A lady faculty member had asked Matthai whether members were required to come on time and leave on time. Matthai's response: This is not a factory!" In many ways, IIMA has been the creative worker's 'dream organisation come true', a world without too many rules and, for everyday purposes, no boss – Exactly as Matthai had intended."

But while admitting that "IIMA affords faculty the fullest opportunity for growth" and "there is no external impediment to the institute's growth", Mohan is scathing in his criticism of recent trends which have caused a dilution of the exacting standards set in place by a colossus like Matthai. "The community (IIMA's own board-appointed community which selects candidates for directorship) lost sight of the Matthai dictum that autonomy is won by unilaterally setting for oneself the highest standards," he rues, while succinctly observing that "the limitations and constraints to growth are internal to the Institute and are entirely self-inflicted. The devil, as always, is within."

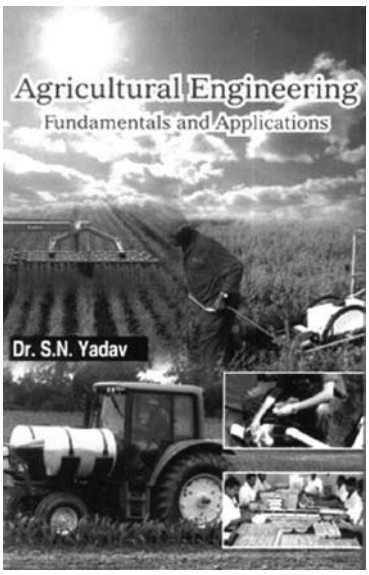
Summing it up with the precision and clarity of a veteran management guru, Mohan opines that institution-building and leadership are "not about enormous resources or great ideas although these are useful. Institutions are built around values and true leadership is all about putting the institution first."

True to its name, 'Brick by Red Brick' is a perfect reconstruction of a great institution and its primary architect. A must-read, not only for aspiring management students, educationists and academics, but also for all those who just enjoy reading a good book when they see one.

SOURCE: The Financial Express, July 10, 2011

Agricultural Engineering: Fundamentals and Applications

By Dr. S.N. Yadav



Agricultural engineering entails the practice of such endeavours which include the designing of farm technology, food and bioprocessing technology, the search for bio-renewable products. The field offers the prospect of not just better scientific agricultural practice, but also sustainable agriculture.

This book has been designed as an introductory text which undertakes a through exploration the concepts and practices which define agricultural engineering. Delineating the principles, technology and techniques which lend shape to this science, the text brings within purview the advantages and challenges offered by agricultural engineering, especially in the current global scenario where food prices have risen dramatically owing to insufficient agricultural production, giving space to a thorough discussion of current trends in the field too, the text incorporates critical perspectives too, which aim to enhance the reader's understanding of the basics of the science of agricultural engineering.

AGRI NEWS

'Farmers' Call to Embrace Technology in Second Green Revolution

Farmers came together with scientists and agri-biotech industry to demand the second green revolution in India. Speaking in a unified voice they agreed that use of new technologies in agriculture was the only hope for farmers and solution to address the challenges of food security. According to a working paper by Indian Council for Research on International Economic Relations (ICRIER), India will have to double its food production by 2025. Faced with tremendous challenges of ever reducing arable land & water resources, quality of soil, climate change, and shortage of labour, farmers find it difficult to enhance their farm yields and need technology push.

The group strongly appealed that the Indian Parliament clears the long-awaited Biotechnology Regulatory Authority of India Bill (BRAI) and Seeds Bill. They also emphasized on expeditious approvals of biotech crop trials and commercialization under the existing system till the BRAI is approved.

Plant biotechnology is a powerful tool that helps farmers provide food, feed, fiber and fuel to a growing global population in a sustainable manner, while reducing agriculture's footprint on environment. Biotech crops have helped farmers increase their productivity while protecting biodiversity by increasing yield per acre.

ASSOCHAM Moots 'Organic Villages' Plan

Hyderabad: Very soon, there could be identified 'Organic Villages', where vegetables, fruits to be grown through organic farming methods would be encouraged, if trade body ASSOCHAM has its say.

A feasibility report is being prepared in two months by ASSOCHAM to identify five villages in five districts of Andhra Pradesh to launch this unique initiative, according to Mr D.S. Rawat, Secretary-General. The Planning Commission and State Government need to help in the initiative. Each farmer who undertakes organic farming is expected to get an increase of 250 percent in income.

The ASSOCHAM report pointed out that India was positioned at a dismally low rank, accounting for just a miniscule 1.6 percent of the total global agri exports pegged at $15.6 billion. In quantity terms, India ranked 222nd as per the Food and Agriculture Organisation's (FAO) trade index.

In the country, agriculture and related activities account for employment to 55 percent of the population and over 10 percent of the overall exports. "Its time the Government took some quick policy decisions to give a boost," said ASSOCHAM.

Despite Centre's Flip-Flop, Saurashtra Plods on with Cotton Farming

The cotton acreage in Saurashtra has increased in some parts this year despite the uncertainties plaguing the cotton export policy. Both markets and a delayed monsoon have played a role in this. Cotton has been sown over 18 lakh hectares in Gujarat and the total acreage in Saurashtra-Kutch alone has touched the 13 lakh hectares mark. Saurashtra accounts for more than 60 percent of total cotton production and 40 percent of the total cotton export from India.

The Centre's cotton export policy saw a major swing last year, which included a total ban on export beyond 55 lakh bales and introduction of new taxes, leaving farmers and traders in the lurch when prices in the international market had touched a record high of Rs 38,000 to Rs 45,000 per candy.

This week, the government announced its decision to lift the ban and farmers are now hoping the Centre provides subsidy on incurred export expense.

Sowing figures available from regional agriculture office indicate that the total cotton acreage in Saurashtra-Kutch has increased by a lakh hectares. Agriculture Department officials have said the sowing activity is still on in Kutch (where the monsoon arrived very late) and Porbandar (where some agriculture land is still submerged following heavy rains). According to them, the final acreage figure might see some changes.

Sowing is almost complete in Rajkot, Jamnagar, Junagadh, Bhavnagar, Amreli and Surendranagar districts, said officials.

The Editor
Financing Agriculture
Agricultural Finance Corporation Ltd.
Dhanraj Mahal, 1st floor
Chhattrapati Shivaji Maharaj Marg
Mumbai 400 001

SUBSCRIPTION FOR 'FINANCING AGRICULTURE'

I / We request you to enroll me / our organization as a subscriber to the Monthly Journal "***Financing Agriculture***" for a period of _____ year(s).

Details are as under

Name: _____

Mailing Address: _____

City: _____ **State:** _____

Pin Code: _____

Email: _____

Subscription Period:One, Two, Three, Year (s) _____

Subscription Amount:Rs. _____

(Rs: 600/- for one year; Rs.1200/- for two years; Rs.1800/- for three years)

Remittance details: Demand Draft / Cheque No.

Date: _____ **Bank:** _____

Cheque / Demand Draft should be drawn in favour of
M/s. Agricultural Finance Corporation Ltd., Payable at Mumbai.
Add Rs.25/- towards collection charges for outstation cheques.

SIGNATURE: _____ **DATE:** _____

Agricultural Finance Corporation Ltd.

Incorporated since 1968

Technical Support Institution Committed to Rural Prosperity (Wholly owned by Commercial Banks, NABARD, EXIM Bank)

Vision: To facilitate increased flow of institutional credit and other support services for rural prosperity.

Mission: To continue to be leading agri-consulting organization by providing timely, appropriate and feasible client – specific end to end solutions not only in India but in other developing countries.

Consulting Services

Specialised services which by no means are exhaustive, can be classified as:

- Agribusiness Management
- Water Resources Management
- Watershed Development and Management
- Environment Impact Assessment & Environment Management Plans
- Horticulture & Plantation
- Micro Enterprises and Micro-Finance
- Fishery, Forestry, Wasteland Development
- Gender Development
- Resettlement & Rehabilitation
- CDM Services

Capacity Building and Training

Projects included in this category are:

- Consultancy for World Bank Assisted Process Monitoring of Andhra Pradesh Rural Poverty Reduction Project – Phase-II (Zone-II) – Society for the Elimination of Rural Poverty, Government of Andhra Pradesh – 2007-08
- Implementation of DFID funded Western Orissa Rural Livelihood Project (WORLP) – Watershed Development Mission, Govt. Of Orissa – 2005-2010
- 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.

www.afcindia.org.in