

FINANCING AGRICULTURE

Vol. 42 Issue 5 May 2010

Rs. 50/-

AGRICULTURAL CROP INSURANCE IN INDIA

**SAFFRON FARMING IN INDIA
THE KASHMIR CONNECTION**



**INTERVIEW
K.V. THOMAS, UNION MINISTER
OF STATE FOR AGRICULTURE**

The largest agri exhibition first time in Andhra Pradesh

AgriTech 2010

Exhibition cum Seminars

15 - 18
June 2010

Venue:
ANGRAU University Campus,
Rajendranagar, Hyderabad



YOU MIGHT IGNORE THIS ADVT,
BUT THE OPPORTUNITY IS TOO
BIG TO IGNORE

ATTRACTION

Business Meet on AP Agriculture
Farmers focussed activities on all days

Concurrent Seminar on

- PPP and Investment Opportunities in farm sector in AP
- Agro and Rural Entrepreneurship
- Input Management in Agriculture
- Horticulture and Food Processing

ORGANIZER



CARD
Centre for Agriculture
and Rural Development

CO-ORGANIZER

ASSOCHAM



The Associated Chambers of
Commerce and Industry of India

SUPPORTED BY



Government of
Andhra Pradesh

For participation and space booking, please contact

Downloading brochure: www.card.org.in

DELHI OFFICE

Siddharth Gautam Tafeem Siddiqui Ashish Mishra
0-9810585797 0-9310134506 0-9560401713
siddharth@card.org.in tafeem@card.org.in ashish@card.org.in

HYDERABAD OFFICE:

Ravi Shankar Yerla Vidya Sagar
0-9030384721 0-9032799652
ravi.yerla@card.org.in sagar@card.org.in

The Event Coordinator

AGRITECH 2010

Corporate Office: A-10, 2nd Floor, Sector-19, Noida - 201301
Ph: 0120-2519630, 4224861 Fax: 0120-2519628
HO: 502 Rohit House, 3 Tolstoy Road, New Delhi-110001
Ph. No. 011-23731129, 30 46569160 Fax : 011-23731130
Email: director@card.org.in; Website: www.card.org.in

Honorary Advisory Board

Shri Y.C. Nanda

Chairman
AFC Ltd.

Shri A.K. Garg

Managing Director
AFC Ltd.

Shri L.N. Vasudev Rao

General Manager
Union Bank of India

Shri G.C. Sharma

General Manager
Bank of Baroda

Shri Gobinda Banerjee

General Manager
Punjab National Bank

Shri E. Shivalingam

General Manager
UCO Bank

Shri P.C. Srivastav

General Manager
Central Bank of India

Shri N. Narasa Reddy

General Manager
Canara Bank

Shri P.M. Kshirsagar

General Manager
AFC Ltd.

Views expressed by the authors do not necessarily reflect those of the Agricultural Finance Corporation Ltd. No permission is necessary to reproduce contents except for the copyright text.

EDITORIAL



Welcome to the May edition of the magazine. Informative articles in this edition on a slew of topics will really impress the reader.

Mr. KV Thomas, Union Minister of State for Agriculture in his interview shares the central government's thinking on important issues pertaining to the farm sector and the solutions thereof.

The cover story is on Crop Insurance. Crop insurance as a mechanism protects the farmers against uncertainties that devastate them and also from the exploitation from vested interests. Often distraught farmers, hit by natural calamities, fall prey to the exploitation of money lenders. The devastation of farmers needs to be checked in the larger interest of the sustainability of the sector.

The article on India's agricultural performance must be read in the backdrop of recent pronouncements about a second Green Revolution. India has to buckle up to raise the agricultural production beyond 340 million tonnes by 2020 to ward off threats of food scarcity coming from the pressure of a growing population. The 11th Plan has a target of taking agriculture to a higher trajectory of 4 percent annual growth.

This edition has an informative piece on India's dairy industry, which proposes milk as a crop and throws in lot of information regarding the potential for diversification into the dairy sector. The article on saffron cultivation in Kashmir is an excellent read. Agri Tourism concept is catching up in India as an additional revenue source to farmers and the article written by a pioneer is certain to inspire similar models elsewhere in the country.

India will soon see a new breed of crop specialists who provide extension services to the farmers in a more focused manner, starting from selection of right seed varieties through nutrition and pest management, post-harvest management, etc. The American Society of Agronomy (ASA) is now working with Punjab Agriculture University, International Rice Research Institute and others to bring its Certified Crop Advisers programme to India. Such efforts augur well for the farm sector which is mulling ambitious growth rates.

It is estimated that even a one per cent increase in agricultural output can make a difference and lead to a 0.7 increase in national income. And perhaps agriculture is the only vehicle that can take this enhanced national income straight to the *aam admi*.

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

Our Agri Policies aim at Augmenting
Farmers' Welfare and Productivity:
Union Minister KV Thomas 6

The Kashmir Connection 9
By F.A. Nehvi, Anwar Alam and Salwee Yasmin

A Case for Broadening Insurance
Cover Exponentially 16
By Dr. A. Selvaraj

Agri Tourism; New Revenue Stream for
Farmers thru Rural-Urban Reunion 20
By Pandurang Taware

I D E



Agricultural Performance in India: Past Trends and Future Prospects	22
By Parmod Kumar	
Organic Farming Strengthens Soil Fertility	29
By Vikram Bokey	
Jatropha can Thrive as Interim Crop.....	30
By S.A. Alagarsamy	
Indian Dairy Sector: Market Efficiency is the Key	32
By Dr. R.S. Khanna and Sharad Gupta	
Agri News	40

Editorial Board

Editor-in-Chief
Shri A.K. Garg

Editor
G. Kalyan Kumar

Associate Editor
Linda Brady Hawke

Event/Advertising
Prasun Nagar
91-120-4210982/83
prasun@lbassociates.com

Design
Atul Kumar
Prakash Chand Arya

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

Our Agri Policies aim at Augmenting Farmers' Welfare and Productivity: Union Minister KV Thomas

In an exclusive interview, Prof. KV Thomas, India's Minister of State for Agriculture, Fisheries and Animal Husbandry spoke to G. Kalyan Kumar, Editor, FINANCING AGRICULTURE Magazine. In the interview, the Minister talks about new policy initiatives by the Centre aimed at improving the lot of farmers and enhancing farm output. Excerpts

Q. As the Union Minister, please throw some light on the current scenario in Indian Agriculture?

Indian agriculture is climate-dependent. So vagaries in climate can bring down production and lead to fluctuations in prices. Nevertheless, India had bumper production of wheat during the period 2007 to 2009 and built up sufficient buffer stock of wheat which is one and a half times more than rice. We have a buffer stock of 45 million tonnes of wheat and rice at 20 million tones. In oil seeds, India is taking giant leaps towards self sufficiency. Considering India's status as one of the largest importers of edible oil, we have activated various agencies to work on improving oil seed production. I hope in another 10-15 years, we will be self sufficient in oil

production. It is a healthy sign to see more and more areas coming under palm oil cultivation.

Q. What are the new initiatives or reforms that will give a fair deal to the farmers?

Small and marginal farmers, who own less than five hectares of land each, are about 80 percent of the about 60 crore farming population in our country. Under the present scenario, agriculture does not mean mere cultivation of wheat, rice or vegetables. The agrarian activities also extend to fisheries and animal husbandry. So the new initiatives and reforms are touching several areas of agrarian activities.

The Government's aim is to maintain a minimum 4 percent growth in

Small and marginal farmers, who own less than five hectares of land each, are about 80 percent of the about 60 crore farming population in our country. Under the present scenario, agriculture does not mean mere cultivation of wheat, rice or vegetables. The agrarian activities also extend to fisheries and animal husbandry



agriculture. For that there should be at least 7-8 percent growth in fisheries and animal husbandry. With regard to fisheries, we are in talks with National Fisheries Development Board to give a new direction to the sector. India needs more fishing harbours and developed markets to grow the sector. The central government is assisting state governments to improve technology, develop modern fishing harbours to improve the over all productivity in the fisheries sector.

Q. Will the subsidy content on edible oil continue?

This question was raised in Parliament by several MPs who wanted to know whether the subsidy will continue even

after the palm oil cultivation has taken good shape. Andhra Pradesh is expanding oil seed cultivation in a big way. The Agriculture Minister assured the Parliament that 50 percent of the subsidy will be borne by the Centre and the rest will have to come from the states. Similar will be the case with coconut also. The government has offered a subsidy of Rs 15 per Kg till January 2009 and thereafter Rs. 25/- per kg of imported edible oil handed over to the States for distribution.

Q. What are the challenges at the paddy and wheat front?

In paddy and wheat cultivation, the main problem is shrinking of cultivated land owing to many reasons. Compared to many cash crops, wheat and paddy are not attractive to farmers. So they make a switch over to other crops. The estimated demand for rice in India is 128 million tonnes for 2012. This will require a production level of 3,000 kg per hectare against the present average yield of 1,930 kg per hectare. The targeted production of rice is 129 million tonnes by 2011-12 with the growth rate of 3.7 percent along with other food grains.

Q. What is the scenario in cane cultivation?

Over the past sixty-five years, the yield of sugarcane in tons per hectare has more than doubled. We are expecting a sugar production of around 16.8 million tonnes by end of September 2010. This bumper production will definitely hammer down retail prices.

In sugar cane, there is a five year cycle. In the first three years there will be bumper production followed by a lean period. So the Government gives subsidies to the millers so that sugar can be exported. Adding to it is the absence of a proper technology to preserve sugar for more than one and half years. Now the government is studying several proposals to address the issues connected with the lean period in sugarcane cultivation.

There had been farmer unrest and a sense of feel good now in the agriculture sector. Do you think measures like loans waiver and higher farm allocation in the budgets gave the succour?

I have some data on these so-called suicides. The so called deaths were never

affirmed by any state government as abetted solely by debt liability or crop failure only. If you look at the MSPs (Minimum Support Prices) we have given to different farming items, it can be seen that in the last 5 years it has gone up five times.

The MSP of paddy (rice) has been increased to Rs 1,000 a quintal (including Rs 50 bonus) for 2009-10 from Rs 560 a quintal in 2004-05. Similarly, there has been about 72 percent hike in wheat MSP in last five years and currently stands at Rs 1,100 a quintal.

The MSPs of pulses have been hiked significantly from Rs 1,390 to Rs 2,300 in tur (65 percent rise), Rs 1,410 to Rs 2,760 in moong (96 percent) and Rs 1,410 to Rs 2,520 in urad (79 percent) during last five years.

Among oilseeds, the MSPs of soyabean and groundnut have seen a rise of 50 percent and 40 percent, respectively while that of mustard has gone up by mere eight per cent in last five years.

The government is purposefully helping the farmer to get a better deal.

Q. How does the new Budget provide relief to the farmers?

The new Budget 2010 addresses the farmers' issue from two angles— long term and short term. The four-point strategy to revitalise agriculture is strong on intent. The plan expenditure to agriculture has been stepped up by nearly 50 percent to Rs 15,042 crore in 2010-11 budget from Rs 10,765 crore revised estimate for 2009-10.

For improving farm credit flow the Minister has raised farm credit target in the budget to Rs 3, 75, 000 crore in 2010-11 from Rs 3, 25,000 crore in the current financial year. *Rashtriya Krishi Vikas Yojna* is a state plan scheme introduced in the eleventh plan to incentivise states through additional resources for agriculture. The 2010-11 budget provides Rs 67.22 billion for *Rashtriya Krishi Vikas Yojana*. The Yojana also includes special initiative for pulses and oilseeds development in selected oilseeds and pulses growing villages. It is a very flexible scheme in terms of usage and diversification in agriculture. Ultimately the states are the key to its implementation. Farm credit targets have

been increased to Rs 3.75 lakh crore and farm loan payments tenure had been extended for six more months.

Q. Please comment on the efforts at Supply Chain reform in the new farm budget?

I strongly believe that a market intervention is essential to balance demand and supply. The PDS system in India is very efficient and in Kerala it has reached perfection. Weeding out undeserving beneficiaries is a task and challenge to be met to ensure that the benefits of PDS goes to the deserving people who are under poverty line. The food subsidy of Rs 53, 000 crores is a huge amount and its benefit must reach the right people. That is our main aim in bringing out the new food security Bill. The long-pending food bill aims at legalising the right to 25 kg of foodgrain to the poor on the PDS. NAREGA is pumping money into rural areas and is raising their purchasing power. To reduce wastage in storage the Budget has provisions for cold storage and hiring more go-down storage space.

Q. What is your take on increasing private Investment in Agriculture?

Agriculture sector needs investment to meet the expenses of irrigation, research and development, rural infrastructure and to increase the productivity. This is the era of modernization and research. The latter cannot be compartmentalized and made the sole business of the government alone. The government has ICAR for advanced research in agriculture. When modernization comes; new technology will be needed, new breeding mechanism will be needed. For these activities, private investment can be tapped. For example, in the research on Gold paddy, India shares joint studies with Philippines. At the end of the day, farm sector is a global market. BT products are already in India though there is resistance.

Q. What is your Government's on BT Brinjal controversy?

Our stand is clear that one should not doubt a technology. In BT Cotton also, there was resistance initially and it subsided later. Now BT Cotton has come to the top. BT Brijal is a consumer food item. If apprehensions are there, we can address it. We have a competent

FACE TO FACE

scientific community that can address all doubts and guide us to the right decision.

Q. How far our laws are helping Ornamental Fish trade in India?

I am proud that the first Ornamental Fisheries Exhibition was held in Kochi in 2002, when I was Kerala's fisheries minister. It was a grand success. Now it has become an annual, international exhibition. More people are coming into this business. The domestic demand is high and exports are showing good growth. National Fisheries Development Board is assisting states in developing their exports. In Alwaye near Kochi, a hatchery has been set up to groom export quality fishes. MPEDA has a target to boost exports of Ornamental fishes to US\$50 million by 2012.

Q. Import procedure of Ornamental fishes is cumbersome; how can the Govt bring relief to this expanding sector?

Importing of animals, plants and fish have to be a careful exercise. We have to ensure that no harm is done to the local industry. The imports have to undergo quarantine strictly. Chennai has a quarantine centre operating under MPEDA. Still ornamental fish might be entering the country through clandestine channels. Tilapia is one example of that.

Overall, aquaculture is doing well. In Prawn seeds also, testing labs are there to guard against diseases. India is emerging as a big supplier for ornamental fish as we have rich biodiversity especially in the northeastern hills and Western

Ghats. MPEDA is looking at capacity building in captive breeding technology for various ornamental fish species. Other measures like standardizing methods for diagnosing viral diseases in ornamental fishes, cluster development and reaching credit to the aqua farmers have created a congenial climate for its growth.

Q. Please throw some light on the Centre's policy on pet Care and putting in place a nodal agency to help Indian exporters dealing in pet related products?

The Department of Animal Husbandry is examining several proposals on how to help the pet care industry. We are aware that the pet care market is expanding and some policy announcements can be expected in the coming years.

SRI VENKATESWARA MODERN FARM

Ph: 04344-222774
Cell: 9787547899, 9843918148
www.svmodernfarm.com



EMU
RABBITS
GINI PIGS
LOVE BIRDS

SELLING
BUYING
TRAINING
CONSULTING

Self Employment Network

Onnaladi Vil., Hosur Tk,
Krishnagiri Distt.,

SAFFRON FARMING IN INDIA

The Kashmir Connection

By F.A. Nehvi, Anwar Alam and Salwee Yasmin*



Saffron commonly known as 'Kumkuma' in Sanskrit, 'Kesar' in Hindi, 'Zaffron' in Urdu, 'Kong' in Kashmiri, 'Keshar' in Bengali, Marathi, Punjabi and Gujarati, 'Agnishikhe' in Kannada, 'Kungumappu' in Tamil, is one of the prized and costliest spices of the world. Botanically known as *Crocus sativus* Linn, it belongs to family Iridaceae, and is a sterile triploid mutant of a wild species *Crocus cartwrightianus*.

It is famous for its intense yellow colour and distinct flavour that it imparts to the food items. The state of Jammu and Kashmir has the distinction of cultivating saffron in India. Bulk of the saffron cultivation in Kashmir was introduced by the Central Asian immigrants around 1st century B.C.

In *Rajatarangini* the author Kalhana includes Kashmiri saffron among those special attributes of Kashmir which according to them "could not be available even in the paradise." The Kashmiri Vaid namely Veghbhata and Sushtra used saffron as an important ingredient in Ayurvedic medicines. Saffron also finds its name in Kashmiri records which dates back to 5th century

Saffron Hubs

Major saffron producing countries include Iran, India, Spain, Morocco, Italy, Greece Azerbaijan, with Algeria, France, Germany and Turkey contributing in small quantity. Saffron is grown in the J&K State on uplands, called in the local dialect as 'Karewas', which have severely to moderately eroded soils, located at an altitude of 1600 to 1800 m.a.s.m.l. The soils are heavy textured with silty clay loam as the predominant texture in upper

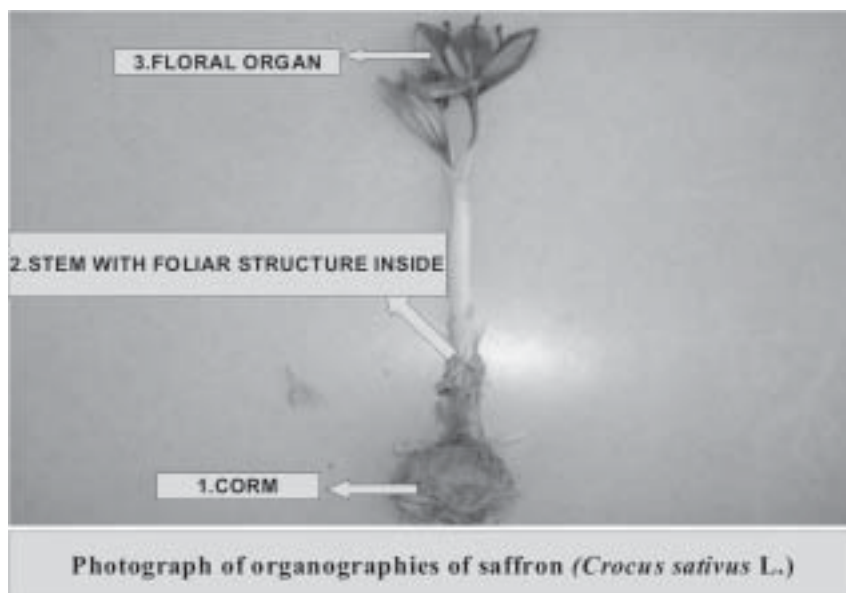
horizons and silty clay in lower horizons. Presently saffron cultivation is confined to districts of Pulwama, Budgam, Srinagar and Doda of the State, with Pulwama district accounting for about 75 percent of the total area, District Budgam, accounting for 16.13 percent and District Srinagar accounting for 6.68 percent. In Jammu province of the State, saffron is grown only in district Doda, accounting for only 2.5 percent of the total area in the whole state. At present total area under this crop in the State is 3,010 hectares with an annual production of 6.50 MT and productivity of 2.15Kg per ha.

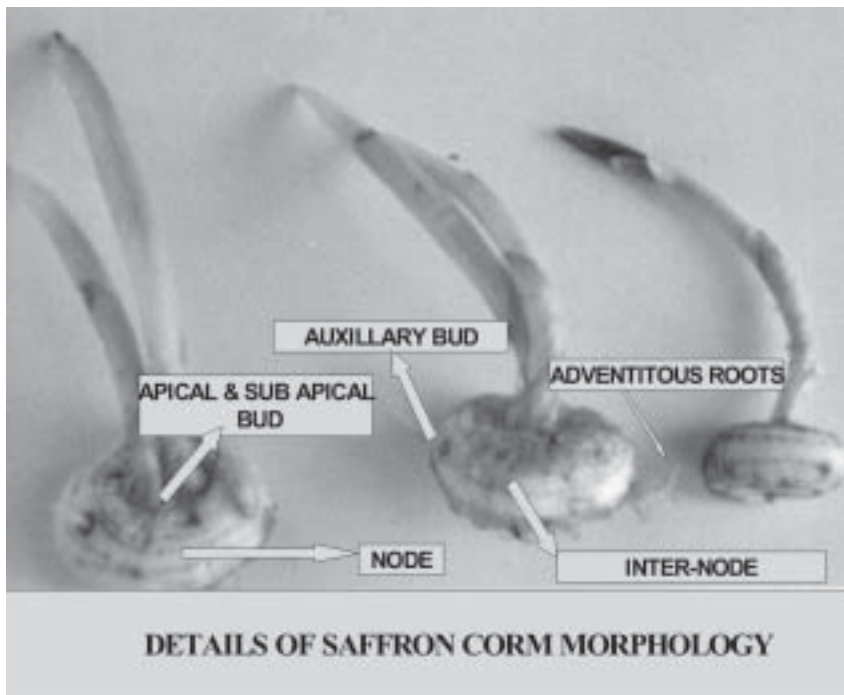
The Plant

Saffron (*Crocus sativus* L.) is a perennial, herbaceous plant attaining a height of 10-25 cm. Corm, foliar structure and floral organs constitute main parts of saffron plant.

a) Corm

Saffron develops from corm which is a sub soil organ composed of parenchymatous tissues serving as base food material for inducing sprouting, flowering, foliage and daughter corms from September to May after surviving the period of summer dormancy. Mature corm measures 3-5 cm in diameter and is protected by fibrous leaf tunics. Apical, sub apical and auxillary buds are found in internodes. Apical and sub-apical buds are of mixed nature that develops vegetative and reproductive sprouts and leaf producing of auxiliary buds. The number of mixed nature buds increases with corm diameter up to 4 cm, beyond which the number of buds remain constant @ 2.6 to 2.8 buds/corm (Perz, 1997).





b) Foliar Structure

After corm activation in September, the buds begin to protrude. Foliar structures begin to appear from 3-5 tubular tunics of white colour known as cataphylls. Cataphylls protect and strengthen stems in the process of appearance on the surface (Botella et al, 2002) and protect the corms, once formed from dehydration and possible lesion (Lopez, 1989). 5-11 green leaves or monophylls between 1.5 and 2.5 mm wide are found per sprout and are called bristles and can measure up to 50 cm (Dhar and Mir, 1997; Lucceno, 1999). Saffron plant also possesses bracts and bracteoles to protect flowers and ovary.

c) Floral Organs

Saffron is an autumn flowering plant, producing light to deep purple coloured

flowers. Saffron flowers emerge in the month of October-November from the bractea axils. Each flower consists of six violet coloured tepals, three inner and three outer ones, united in a long tube that starts at the top of the ovary. Each flower is borne on aerial shoots emerging from apical bud of mother corm of a comparatively large size and contains 6 perianth lobes three inner and three outer ones, united in a long tube that starts at the top of the ovary, 3 stamens, 1 pistil having an inferior ovary and 3 brilliant orange red stigmas on a 3-branched long style. On an average pistil length averagely ranges from 5-6 cm with stigma measuring 2.5 to 3.0 cm.

Biological Cycle

Biological cycle of saffron is typical in nature in the sense that plants are

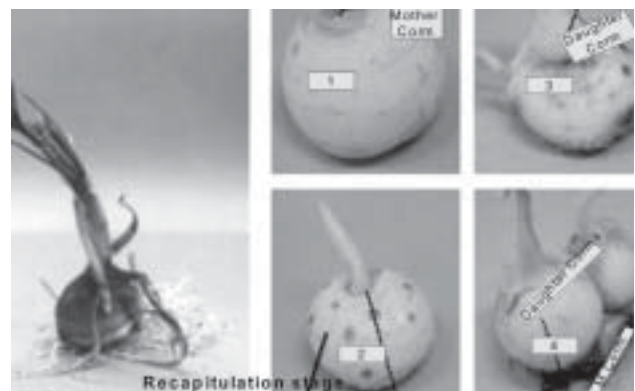
preparing to start their life cycle when other plants are preparing to protect themselves against the vagaries of winter. Biological cycle of saffron is divided in to 5-6 stages (Chrungoo et al, 1983; Jirage et al., 1994).

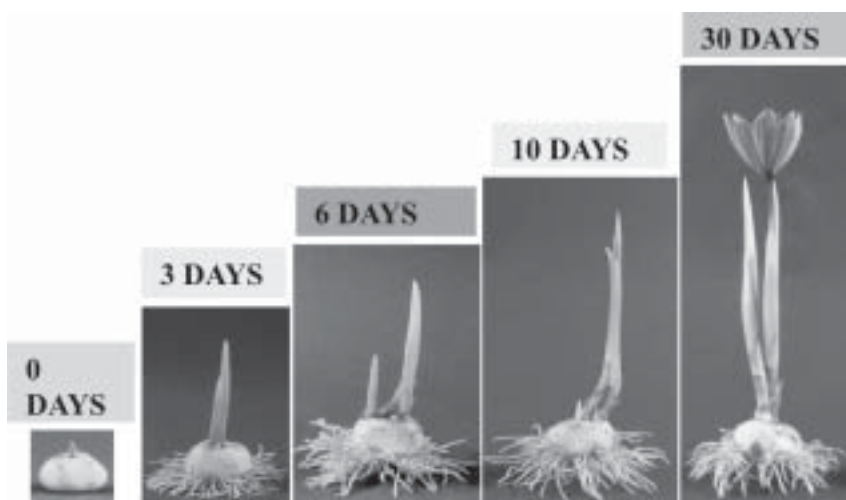
Recapitulation Stage

Recapitulation stage lasts for two years. In the month of April-May when the temperature starts to rise, the roots from the corm die and fall off leading to drying of foliage which ultimately fall few centimeters from the soil. Starting from July the apical bud takes a year to acquire the maximum size to become a corm. Another year goes by before it is depleted and ends up like a wrinkled black disc. The stage is known as recapitulation because throughout this period the corm recognize the bud and determine how many will produce the flowers how many leaves only and how many will not sprout the following year.

Dormant Stage

Corms enter a dormant stage from May. Although important ontogenic process that lead to differentiation of floral and vegetative buds take place (Koul and Farooq, 1984), nothing is observed externally. During this period, growers prepare the corms for fresh plantation after digging followed by sorting and cleaning to rejuvenate their saffron crop. Extreme summer temperatures do not exhibit any adverse effect on the corms because of reduced biological activity throughout these months. During dormancy there is decrease in starch concentration in the corms. Starch is transformed into sucrose and other suitable soluble sugars which go to tissues where buds are being differentiated and developed. (Chancrous et al., 1983).





d) Activation stage

Activation stage in saffron begins from September when the day temperature reaches to around 25° C and night temperature to around 15° C. Corms begin to sprout with floral and vegetative structures growing in length inside the cataphylls. Each corm produces 1-4 sprouts with some of them producing flowers. During the month of October, sprouts are visible above the ground and the sub-soil stem is short. Very fine roots also start to protrude in the form of crown from the third basal internodes, possibly reaching a length of 5 cm (Bothell *et al.*, 2002).

Flowering Stage

This is the stage when the saffron fields offer a colorful aspect. It starts in the second fortnight of October and lasts up to the first week of November. Flowers emerge in 3-4 flushes with massive emission known as covering in the 2nd flush. Each flush lasts for 2-6 days. Flowering declines with the 3rd flush. Radicle leaves may or may not be present when saffron blooms as saffron is hysteranthous. At the beginning of

November, commencement of degeneration of the mother corm is visible, which looks quite wrinkled and flat (Medina, 2003).

Vegetative Phase

This phase starts in November immediately after flowering is over with the young leaves emerging from the corms. The young sprouts are transformed into daughter corms and start to develop due to photosynthesis besides contribution from the mother corm, which becomes wrinkled and leaves space for new corms (Ruceda, 2003). All sprouts produce leaves growing to a height of 40-60 cm till April. Good foliage is the success of future crop as it leads to good corm growth and multiplication. By the first fortnight of April, contractile roots look like a dried up appendage and falls off the daughter corms (Oromi, 1992). Leaves also start to change colour.

Composition

Saffron is valued for its colour, taste and aroma. The compounds that give it those properties are what define its quality.

Crocetin glycosyl esters are responsible for its characteristic colour. In regard to the characteristic bitter taste of saffron, it is postulated that it is due to the presence of a glycoside named picrocrocin. Finally an extensive group of compounds are responsible for saffron aroma, mainly ketones and terpenic aldehydes amongst which saffranal stands out due to its high proportion, between 47 and 72 percent of the volatile matter (Alonso *et al.*, 1997; Tarantilis and Polissiou, 1997).

Saffron Composition

S NO	Component	Value (%)
1	Moisture	6-12
2	Mineral Matter	4-8.5
3	Raw Fibre	4-5
4	Proteins	10-14
5	Total Sugars ⁽¹⁾	26-27
6	Gentibiosides	2-3
7	Glucose	7-8
8	Fructose	1-2
9	Xylose and ramnose	Traces
10	Pentosanes	6-7
11	Starch	6-7
12	Pectins	6
13	Gums and dextrans	9-10.5
14	Essential Oil	0.3
15	Fats ⁽²⁾	5-8
16	Vitamins ⁽³⁾	0.3-1.38 *

(Source: Saffron colour, taste and aroma, 2006)

- (1) Including those from pigments after hydrolysis
 - (2) Stigmasterol, campesterol, B-sirosterol among others
 - (3) Riboflavin and thiamine
- *in µg/g



HOW TO GROW SAFFRON?

Climate

Temperate climate with sunny days during the flowering period is favorable for good yield. Rains during September are favourable to initiate timely growth of roots and floral/aerial vegetative shoots. Localities at an altitude range from 1500 to 2400 feet are covered with snow during winter provide necessary chilling for commercial cultivation of saffron.

Soil

Well-drained loamy soil with neutral reaction is best suited for saffron cultivation.

Land Preparation

First of all before planting saffron deep ploughing is done involving tilling the soil to a depth of approximately 30 cm using bullock drawn plough and planking. Every month from January to September, ploughing is done in the same furrow to achieve required depth as well as to keep the field clean. This operation is not difficult to mechanize using tractors and matching ploughs and harrows.

To avoid water stagnation to which saffron is sensitive, the field is laid out into 2m wide and 10-20 m long strips across the field slope with 30 cm wide and 15 cm deep drainage channels on both sides. Earlier, beds were made of 2 x 2 m size with drains all around but now long strips are preferred. After bed formation sowing is done by hand dropping saffron corms behind plough. Estimated cost on account of land preparation involving draught animals and human labour amounts to Rs.10, 250 per hectare. The cost can be reduced by using bed planter. Semi-automatic vegetable transplanter also holds promise.

Corm Treatment

To control corm rot, selected corms are given treatment with copper oxychloride 50 W.P @ 0.3 percent or Mancozeb 75 W.P @ 0.3 percent or Carbendazim 50 W.P @ 0.1 percent



before planting. After sorting, the healthy corms are dipped in the above fungicidal suspension for a period of 5-10 minutes. The saffron corms are then spread on a cloth and allowed to dry in shade for a period of 10-15 minutes.

Corm Planting

Corms are dug in the second fortnight of August as soon as contractible roots emerge and planting done in the first fortnight of September after grading the corms. Research studies in Kashmir have confirmed importance of corm size in improving saffron productivity. Therefore, sorting of saffron corms is imperative. Manual labour utilized in sorting of corms amounts to a heavy expenditure of 12500 Rs/ha. Saffron corms can be sown using planters with some modification to sow large size corms (> 2.0 cm). Sorted corms are planted in furrows at a spacing of 20x10 cm and at a depth of 15 cm.

Furrows are then covered with soil leaving an intra bed drain of about 7.5 cm deep. The most suitable machines for this operation are onion planter/potato planter/tulip planter. Major drawback in mechanical depositing of corms in the bed is the lack of consideration to their polarity, corms planted deviant from their vertical axis or upside down have delay in sprouting and decline in productivity (Galigani, 1982). In Spain saffron corms are planted in a mesh cage (width 45 cm) on raised beds 1.5 m wide with the help of tulip planter at a density of 6 lakh corms/ ha. This is meant to facilitate the subsequent extraction of the corms from the earth at the end of planting cycle. Although the cage system seems to provide the operator some ease, it has not met expectation due to tendency of cage to wrap and of the corms to slide inside the cage,

consequently causing variation in planting density.

Corm accounts for single most costly input in saffron cultivation. At a spacing of 20 x 10 cm about 5 lakh/ha of corms are required. At 8 g/corm it amounts to 4 t/ha corm. In monetary terms it comes to Rs5, 00,000/ha at a market rate of Rs 1,25,000/t.

Weeding/Hoeing

Weeding and hoeing accounts for major labour cost component (35% of the total labour cost). Some 21 weed species stand already identified in saffron fields of Kashmir which needs proper control besides damage by rats, resulting in poor saffron corm multiplication & growth. Hoeing is done to aerate the saffron beds and destroy weeds. First hoeing is done in June with short handled hoe called Zooni. Second hoeing is done in September. Beds are properly leveled by borrowing soil from the drainage channels After the flowering is over weeding is practiced in January & April to promote daughter corm production.

Manuring/Fertilization

For higher saffron yields and production of quality planting material, application of 30 kg N, 20kg P₂O₅ and 15kg K₂O per hectare in combination with FYM @30 t/ha, vermicompost @ 2.5 q/ha and Azatobacter is recommended. Phosphorous and potash and half quantity of nitrogen are to be applied at the time of second hoeing and the remaining half nitrogen to be applied at the time of third hoeing. As an alternative application of N90:P60:K50 kg/ha in combination with FYM 10T/ha and vermicompost @ 5 Tons/ha is also recommended.

Irrigation

For accelerated growth of roots and floral primordia and post flowering vegetative and corm multiplication the saffron crop should be sprinkler irrigated @ 700m³/ha. Water is distributed over 10 weekly irrigations with 7 irrigations to be provided in September-October (Sprouting stage) followed by 3 irrigations at an interval of 7 days from 8th November-30th

November (Post flowering stage). However, under actual field conditions saffron in Jammu and Kashmir is cultivated under rainfed ecology as saffron fields does not have any irrigation source at present barring few examples of dug wells/tube wells.

Harvesting and Drying

October and November provide a festive look to saffron areas of Jammu and Kashmir as god decorates saffron fields with purple carpet of flowers. Old, young and children attend fields and gather flowers in willow/plastic baskets. Ladies sing songs and exchange a handful of flowers with vendors for cosmetic items. Saffron flowers are normally hand picked in the early morning hours. Work is prolonged and done in bent posture. Flowers are taken to home for separation of pistil that is saffron. All family members have saffron as priority. However, under bulk harvest flowers are dried in sun to reduce post harvest losses. Mechanical harvesting is hindered by three factors namely:

- i. Flower grows just a few centimeters above the soil surface
- ii. Flowers usually appear with /or after leaf appearance.
- iii. Quality is adversely affected if soil clods get picked up along with the flowers.

Hence mechanical harvesting of the flowers would damage the foliage it drastically reduces the production of replacement corms. Effort in mechanical harvesting will definitely be economically viable as the input cost is very high. Care has to be taken that the quality of the product is not affected. About 90 man-days are required to separate the pistil from saffron flowers produced from 1 ha of land. These labour days are required in the month of October-November when the farmers are busy. Normally saffron is collected in three pickings at an interval of 4 days starting from last fortnight of October. Efforts have been made to separate the styles from the stamens and petals by means of a wind tunnel consisting of a variable section pipe which exposes the cut flowers to an air draught created by various vortices.

In a simplified version, the petals are

separated from the stamens by a fan and separated manually or by means of a flat or cylindrical iron screen, but this operation also needs to be completed by hand. In Kashmir, generally drying is carried under shade which generally takes 27- 53 hours to dry the product to a safe moisture level of 8 percent. Slow drying results in quality deterioration of saffron. Solar heated air dryers, designed and fabricated in Kashmir, reduce the drying time to 3-4 hours and the product shows pigment concentration very close to that found in fresh saffron. Solar saffron dryer has a drying tray with a mesh wire bottom and a roof to protect from inclement weather, dirt and dust. A glass shielded solar collector with corrugated black coated GI sheet absorber creates air flow above ambient through natural convection.

Fresh saffron (1kg) kept in drying tray is dried in about 4-6 hours to moisture content of 8-10 percent. Its approximate cost is Rs 6500. Hot Air Dryers are specially designed for inclement weather and the farmer can use it indoor. It is a tray dryer. Heated air 45 ± 5°C is circulated with supplemental heating using electricity, LPG stove or soft coke. Modified Hot Air Dryer has four drying trays of 1 m² size each and 100 cm chimney. It has thermally insulated body conserving energy. Approximate price of this dryer is Rs 15000.

Packaging, Grading and Marketing

Dried saffron is sold to middlemen/brokers and ultimately to the firms/agencies where saffron is being processed for market use. Saffron packaging is done manually in plastic container or plastic sachet/pouches in two grades Lacha (pistils) and Mongra (stigma). Attention is given to saffron packaging to make the product attractive.

Corm Digging

At the end of the planting cycle (7-10 years in certain case up to 15 years) the saffron corms are gathered from the field. On an average 80 man days are required to dig and gather saffron corms from 1 ha of land.

Mineral Composition of saffron

	Nutrient	Value
1	Total Nitrogen (%)	1.40-2.70
2	Total Phosphorous (%)	0.36-2.11
3	Potassium (%)	1.57-8.63
4	Calcium (%)	0.02-1.01
5	Magnesium (%)	0.16-1.88
6	Iron (mg/kg)	117.60-1491.81
7	Manganese (mg/kg)	2.47-48.10
8	Copper (mg/kg)	2.87-149.28
9	Zinc (mg/kg)	3.80-125.54
10	Sodium (%)	130.94-2443.60

(Source: Saffron colour, taste and aroma, 2006)

Test Value Range of Saffron Pigments

1	Bitterness (as direct reading of absorbance at 257 nm)	42-75
2	Colouring strength (as direct reading of absorbance at 330 nm)	27-41
3	Colouring Strength (as direct reading of absorbance at 440 nm)	97-142
4	Acid Insoluble Ash (% mm)	0.96-1.61

(Source: Agri Chemist Kashmir, 2007)

Uses of Saffron

About 16000 farm families from 226 villages are associated with the trade of saffron directly or indirectly and thus is a vital source of their lively hood. In J&K State, after fruits, saffron is the main source of state exchequer and at present is Rs 150 crore industry. Saffron, an industry in itself, involves growers, middle men, agents, brokers, agro processors and firms in the saffron trade. A major junk of saffron produced in the state of J&K is consumed in the national market particularly in famous temples of India. However, a huge quantity of saffron is also imported from other saffron producing countries particularly Iran.

Export of saffron from India is a regular feature of international trade. India mainly exports saffron to Spain, followed by France, USA, UK, UAE, Israel, Japan etc and faces stiff competition from Iran,



Spain, Greece and Morocco. In the international market, all saffron producing countries provide a boost to the economy by earning foreign exchange. Data suggests that Iran exports 90 percent of its produce every year. Saffron has been used in very small quantities in food for ages besides being used in traditional systems of medicine for curing different ailments.

Saffron as Medicine

Saffron merits usage as a medicinal herbology from ancient times. Saffron is composed of three chemicals; bright yellow colouring carotenoid pigment, a bitter taste picrocrocin and a spicy aroma saffranal with caretonoid attributing it an anticancer, antitumour effect and immunomodulatory properties. Saffron finds many uses in Ayurveda, Unani, Chinese and tibetan medicine. It is popularly known as a stimulant, warm and dry in action helping in urinary digestive and uterine troubles.

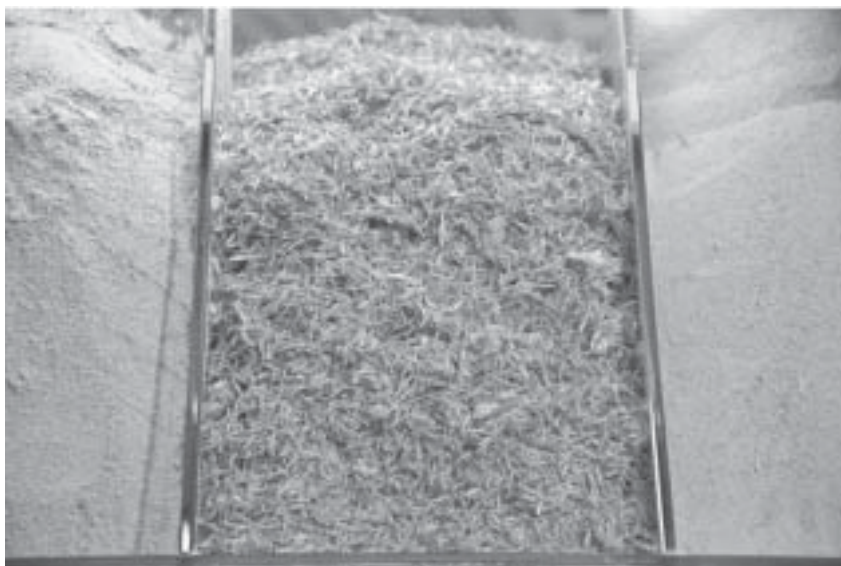
In Ayurveda saffron is used to cure chronic diseases like asthma, arthritis, for treating cough and cold, acne and to regulate menstrual disorders. It is also

used in fevers and enlargement of spleen and liver. Saffron had been found to be beneficial in the treatment of several digestive disorders, strengthening the function of stomach, antispasmodic, diaphoretic, a sedative which combats cough and bronchitis, mitigates colic and insomnia. An antioxidant property of saffron cannot be ruled out.

Aqueous and ethanol extracts of saffron have been found to reduce blood pressure in dose dependent manner. The potential of saffron extract and its active caretonoid ingredients for treatment of neuro-degenerative disorders accom-panying memory impairments, psoriasis, and allergic asthma and as antidepressant, anti-inflammatory as well as anti-seizure remedy cannot be ruled out. The Iranians use saffron as an anticonvulsant remedy. Some data also suggest that crocetin may be helpful in preventing Parkinsonism. Recent research has suggested suppression of LDL oxidation by crocetin contributes to attenuation of arthesclerosis. Saffron is also rich in many vital vitamins including Vit A, folic acid, riboflavin, niacin and Vit C that are essential for optimum health.

Saffron as Spice

Saffron is a regal spice of matchless aroma and is the costliest in the world. 1,60,000 flowers are needed to make one kilogram of pure saffron. Each filament can colour 700 times its own weight in water. The "golden spice" as it is known finds its use as a colouring and flavouring agent. It has a distinct aroma and flavour because of the



chemical component safranal and picrocrocin.

Because of the presence of natural caretonoid chemical compound crocin, it imparts yellow colour. It is used in soups, sauces especially in rice dishes to give bright yellow colour and distinctive flavour. In Middle East, it is extensively used in rice, coffee and desserts.

Saffron tea is also becoming popular. In Spain, where saffron is also cultivated, it is used for making typical Spanish cuisines. In Kashmir saffron is used in preparing "zaffrani kehwa" and is also used as a colouring agent in Kashmiri wazwan. Not only this, saffron is also used in dairy for coloring butter and cheese, used as a key ingredient in the manufacture of flavoured chewing tobacco. Since saffron is a natural organic colourant and unlike other plant colourants it is highly permanent and does not fade easily hence finds its use as a dye. Also saffron finds its use in cosmetic industry as an ingredient for making face marks to remove pimples, to soothe rashes as an antiallergenic. It is also use in beauty soaps. The dried stigmas are used for making perfume.

Saffron in Perfumes

Owing to its health properties as a relaxant and natural cure against headaches, in the Middle East, Saffron is used to prepare an oil based perfume called "Zaafan Attar" which is a blend of saffron and sandal wood. Saffron is also used as a perfume ingredient in many famous internationally renowned brands.

Saffron is a regal spice of matchless aroma and is the costliest in the world.

1,60,000 flowers are needed to make one kilogram of pure saffron. Each filament can colour 700 times its own weight in water. The "golden spice" as it is known finds its use as a colouring and flavouring agent



In Dairy Industry

Saffron gives a lovely colour to butter and cheese. It also enhances the taste and provides many health benefits. It is also used in Saffron Ice cream. Saffron is used as a key ingredient in the manufacture of flavoured chewing tobacco (Zaafрани Zarda) mainly used in India. Saffron enhances the taste to a great extent.

Food Industry

Saffron is used in the food industry as one of the ingredients in dehydrated food stuff, mixes, soups, masalas, ice cream and many other processed food products. Using modern industrial food systems, products such as, saffron dessert powder, saffron crème caramel powder, saffron beverage powder, saffron cake mix, saffron cream powder, saffron batter powder, saffron soups and ready to use saffron spice mixtures for a variety of uses have been produced and offered to consumers. (*Shariati-Moghaddam 2004*)

Saffron in Rituals

Before the Renaissance, saffron had several religious uses. Even today, Indian women, when offering prayers, receive a paste of saffron on their foreheads (Tikka) as a symbol of blessings, good luck and benevolence. Also in India, saffron is offered as a sacrifice in many temples. Certain holy texts have been known to be written with saffron ink.

Saffron in Cosmetics

In Asian countries, where the yellow colour produced by soaking saffron

filaments in liquid was called "the very perfection of beauty", saffron became the most valuable cosmetic that could be obtained. The use of saffron as a face mask to remove pimples and soothe rashes was in the olden days limited to royal women or women from the houses of wealthy aristocrats or merchants. These ladies used it for a variety of purposes. Saffron is antiallergenic and a paste made from saffron, applied on the face and exposed parts of the body was used in the same way as foundation makeup is used by women today.

Not only did this saffron paste impart smoothness to a woman's skin, it also gave the skin a golden tint, which was thought to be so desirable that pregnant women even drank saffron infused in milk in the hopes that their unborn infants would acquire golden complexions. Saffron extract is also used in beauty soaps. Traditionally Indian brides use it for ceremonial painting of their skins. The use of saffron in the cosmetic industry is now fairly widespread with the trend to use natural products and owing to its active substances. Safinter is the leading supplier of saffron to the cosmetic industry. Hossein-Fekrat (2004) demonstrated the application of saffron extracts from dried saffron stigmas by aqueous ethanol in formulations of cosmetics, skin cares and sun protection products. Its dried stigma is used in dyes and perfumes.

** The writers are academics at Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar*



AGRICULTURAL CROP INSURANCE IN INDIA

A Case for Broadening Insurance Cover Exponentially

By Dr. A. Selvaraj*

All over the world agriculture is synonymous with risk and uncertainty. Agriculture contributes 24 percent of the GDP and any change has a multiplier effect on the economy as a whole. Economic growth and agricultural growth are inextricably linked to each other. Crop insurance helps in stabilization of farm production and income of the farming community besides helping in optimal allocation of resources in the production process.

Factors like weather, pests and diseases continue to affect crop production in India year after year. At least 65 percent of Indian agriculture is heavily dependent on natural factors, particularly rainfall

that is increasingly becoming unpredictable and uncertain. The rainfall variations account for more than 50 percent of variability in crop yields across the country. There is no way that we can control weather factors but the related adverse financial effects can certainly be mitigated by crop insurance. Such insurance can lead to stable growth of the agriculture industry.

The Government of India has been concerned about the risk and uncertainty prevalent in agriculture. As all of us are aware about the unfortunate deaths of farmers in Maharashtra who got caught in a debt trap and the devastating effect it had on their families. In this article, we

will try to trace the genesis of the crop insurance scheme and its effectiveness. We have attempted a comparison of the Indian scenario vis-à-vis the scenario in Western nations.

Agricultural Insurance provides the farmers insurance coverage and financial help in time of their needs. India is a land of agriculture and a vast majority of people depends on this profession.

Vulnerability

Agriculture in India is vulnerable to many kinds of damages which are caused by natural calamities like flood, excessive rain and hail-storming, diseases and pests which play havoc on the crops.

Agricultural insurance schemes provide the farmers financial support in case they are caught in any undesired situation which proves fatal to their crops. Agricultural Insurance in India mainly covers the agricultural lands which are spread over rain-soaked areas. The farmers having their lands in the flood and rain affected regions often bear the brunt of the nature. The agricultural lands are washed away by excessive rain causing flood which damages crops. Sometimes, crops are attacked by pests or they die of diseases. These types of sticky situations often prove very fatal to the farmers.

India is an agrarian society with 75% of the population depending on it, for their livelihood. Agriculture or crop insurance has assumed importance in the light of large scale damage caused by pest attacks, crop diseases and vagaries of weather. The objective is to provide insurance coverage and financial support to the farmers in the event of failure of any of the notified crop as a result of natural calamities, pests or diseases.

The list of crops being covered for insurance differs from state to state. Generally quite a few Kharif and Rabi season crops are covered. These crops are insured at the community/block/gram panchayat levels. Agriculture insurance schemes are of immense help to farmers, providing them with financial security. To save the farmers from these kinds of difficult situations, there are several agricultural insurance companies in India. These companies compensate the losses of the farmers done by any natural calamity. Besides, Crop Insurance schemes in India also encourage the farmers for implementing progressive farming techniques through the usage of technologically rich agricultural apparatus and high value in-puts.

Pioneering role of AIC

Agricultural Insurance schemes in India are looked after by Agriculture Insurance Company of India Limited (AIC) which has been formed by the Government of India. The national corporation of agricultural insurance was set up in the larger interest of the farmers. Agriculture Insurance Company of India Limited (AIC) promotes 5 other organizations, each of them having individual percentage of share holdings. The names

of these organizations are as follows:

- General Insurance Corporation of India (Share holding: 35 %); [National Insurance Company Ltd (Share holding: 8.75 %); New India Assurance Co. (Share holding: 8.75 %); Oriental Insurance Company Ltd (Share holding: 8.75 %); United India Insurance Co. Ltd. (Share holding: 8.75%)].
- National Bank for Agriculture and Rural Development (Share holding: 30%).

Benefits of Crop Insurance

- (i) Cushions the shock of disastrous crop loss, by assuring farmers a minimum of Protection.
- (ii) Crop Insurance spreads the crop losses, over space and time. As agricultural income is an important factor in national income, crop insurance also has an effect on the prosperity of the country. It gives farmers greater confidence, in making greater investments in agriculture.
- (iii) It improves the position of farmers in relation to agricultural credit.
- (iv) The Government will be relieved of present uncertain financial burden of providing relief.
- (v) It can help normalize the availability of supplies and stabilize prices.
- (vi) It will help maintain the dignity of farmers.
- (vii) It enables maintenance of systematic records of crop production.

To be insurable, a risk must satisfy the following main criteria:

- (i) The probability of a loss in the future, should lend itself to estimation. This is possible only if reliable data of losses, is available for a sufficiently long period in the past.
- (ii) The loss must be capable of being estimated in financial terms.
- (iii) The probability of occurrence should not be too high, to make insurance unaffordable
- (iv) Occurrence of an event, or the damage it causes, should not be affected by the insured's behavior (Moral Hazard)
- (v) To the extent possible, the risk should be an 'Independent Risk'

Essential in India

Agriculture, compared to other economic sectors has a vital role in terms of assuring required food security for growing population. One of the main problems that hinder more agricultural development is natural risky variables. Undoubtedly, one of the most important barriers of attracting private investment in agriculture has been the existence of damaging natural events and incurable hazards that always menaced agricultural products in the country. The existence of high natural risks in a country, continuously lead farmers to many problems and can discourage them from investing in this sector. This will decrease agricultural investment and deplete agricultural output and food scarcity.





The advantages of crop insurance are the following.

- i. It provides protection to farmers against losses caused by crop failure and ensures stability in farm income
- ii. It also strengthens the position of co-operatives and other financing institutions of agriculture substantially. It also enables the farmers to repay their loans in years of crop failure.
- iii. By protecting the economic interest of the farmers against possible risk or loss, it accelerates adoption of new agricultural practices.
- iv. It minimizes the problem of rural indebtedness, which is traceable to the frequent failure of crops.
- v. It also reduces, to some extent, government expenditure incurred on relief measures extended to meet the havoc caused by natural calamities.
- vi. It may act as anti-inflationary measure, by locking up part of the resources in rural areas.

The importance of agriculture in Indian economy is immense in terms of its contribution to GDP – at around one fourth. It provides livelihood to a vast majority of rural mass consisting about three fifth of its population spreading through length and breadth of the country. Above all, the dream target of

8 percent growth in medium term by the policy makers depends largely on the agricultural and allied activities. However, the agriculture sector in India continues to be the most vulnerable sector despite the improvement in scientific and technological innovations. Given its inherent link to the vagaries of nature, agricultural production is susceptible to production variability.

It is not just India that is lagging in providing public crop insurance. In developing as well as developed world, Government run crop insurance schemes are incurring huge losses without even delivering effective products. The inadequacy of such schemes is a well-established fact. On the other hand, private insurance does exist in situations where it is feasible and no subsidized insurance is offered. The farmers stand to benefit even more from private insurance when there are several competitors.

Scenario in India

In India, an all-risk Comprehensive Crop Insurance Scheme (CCIS) for major crops was introduced in 1985, coinciding with the introduction of the Seventh-Five year plan. It was subsequently replaced by the National Agricultural Insurance Scheme (NAIS) with effect from 1999-2000.

These schemes were announced after years of preparation, studies, experiments

and trials on a pilot basis. The Agriculture Insurance Company of India Limited (AIC) was formed by the Government of India with a mission to provide financial security to persons engaged in Agriculture and allied activities through insurance products and other support services.

Covered Crops

There are about 100 million farmers in India who work hard and yet suffer the most. Their occupation is fraught with the high risks and is at the mercy of nature. It becomes the primary duty of Government to think of the welfare of farmers which would necessitate thinking of ways and means of reducing the risk in farming. Crucial aspect of agriculture is weather. It can make or break a farmer's fortune. If rains fail, crops fail.

Agricultural Insurance Scheme (NAIS) was introduced from Rabi 1999-2000 replacing the erstwhile Comprehensive Crop Insurance Scheme (CCIS). The main objective of the scheme was to protect the farmers against crop losses suffered on account of natural calamities, such as, drought, flood, hailstorm, cyclone, fire, pests and diseases. The new scheme is now available to all the farmers - loanee and non-loanee - irrespective of their size of holding. It envisages coverage of all the food crops (cereals, millets and pulses), oilseeds and annual horticultural/commercial crops, in respect of which past yield data is available for adequate number of years.

Among the annual commercial/horticultural crops – seven crops, namely, sugarcane, potato, cotton, ginger, onion, turmeric and chillies, are presently covered. All other annual horticultural and commercial crops will be placed under insurance cover in the third year subject to the condition of availability of past yield data.

The new scheme would operate on the basis of an Area Approach i.e. defined areas for each notified crop for widespread calamities and on an individual basis for localized calamities such as hailstorm, landslide, cyclone and flood. Individual based assessment in case of localised calamities would be implemented in limited areas, on experimental basis initially and, shall be extended in the light of operational experience gained. Under the new scheme, each participating State/UT is required to reach the level of Gram

Panchayat as the unit of insurance in a period of three years.

Improvement Required

Despite a plethora of schemes launched from time to time in the country, farming insurance has only served a restricted purpose. The exposure in terms of area, number of farmers and value of agricultural output is very small, payment of indemnity based on area approach overlooks affected farmers outside the compensated area, and most of the schemes are not doable. Escalating the exposure of crop insurance would, therefore, increase Government costs noticeably. Unless the programme is efficient to make it doable, the prospects of its future expansion to include and force more farmers are remote.

This requires new pains by Government in terms of appropriate mechanisms and providing financial support to agricultural insurance. Providing similar help to private zone insurers would help in escalating insurance exposure and civilizing feasibility of the insurance scheme over time. With the superior mixing of rural scenery and communication system, the piece region of insurance could be brought down to a village panchayat level. Good supremacy is as important for a range of developmental programmes as for the thriving of a farming insurance scheme.

Poor governance harmfully affects advanced actions. With the upgrading in governance, it is viable to operate and recover upon the recital of various programmes including agriculture insurance.

Need for Awareness

For developing the insurance culture, it is necessary to increase farmers' knowledge about its uses and functions. One of the important factors is building relationship with insurance agents who can assess adoption of crop insurance based on previous risk records of farms. Therefore identification of different types of risks and the effects of each one on crops and covering them with insurance can be effective to increase agricultural products.

Preparing ways to establish Farmers Corporations and harnessing their contribution through experts can? forecast damages and estimate



compensations. Suitable methods should also be applied for forecasting damages and estimate compensations. In this case, determining the damages measurement indexes and professional experts in the farm are very important.

Catalyst

Agriculture crop insurance itself cannot increase productivity or be a source of financing but it can certainly play a role in enhancing both. Agricultural insurance schemes are more complex than other insurance products. There are certain limitations and inherent constraints that prevent a rapid growth of insurance business in rural areas. Therefore to transform Agri-insurance business into a successful business to insurers as well as to farmers its concept should be clear with easy-to-understand clauses favoring farmers.

The rural markets are still virgin territories to a great extent and offer exciting opportunities for insurance companies. The surest path to success is to judge and measure the requirements of the people correctly and offer a scheme that they would be able to afford. There is also an urgent need to enter into tie-ups or understandings with government agencies to ensure the success of the schemes. The need of the hour is to have innovative policies that have explicit benefits for the people to observe, understand and measure.

The crop insurance has therefore become no more than a loan insurance, which insures the lenders at the cost of the farmers who have to pay the premium. The unfair system, which is in sharp contrast to the other schemes of insurance available in other sectors and for individuals, provides yet another example of how so many systems in our economy are weighted against cultivators. Despite significant headways being made, the agriculture insurance is more or less still a far cry in India. State Governments and the agencies who are participating in various agriculture insurance schemes have to educate the farmers on the Scheme features, to guide them in filling the proposal forms and collecting the required documents.

In the matter of marketing agriculture insurance products, it seems private insurers are more flexible and accessible to the farmers and more farmers seem to repose faith in these private players to protect their yields. It will definitely warrant the private players to innovate more and more in their agriculture-related products in order to cover this vital untapped area.

** The writer is Associate Professor of Commerce, Gobi Arts and Science College (Autonomous), Gobichetti-palayam, Tamil Nadu*

Agri Tourism; New Revenue Stream for Farmers thru Rural-Urban Reunion

By Pandurang Taware*



Agricultural production poses many difficulties. So traditional farming needs to be supplemented new sources of income by innovative agro activities to maximize returns from the farm. In this context, Agri and rural tourism has become an effective tool for farmers.

It was my childhood memories from the small village 'Sanghavi' in Baramati taluka that motivated me to start Agri Tourism through Agri Tourism Development Corporation (ATDC). As an innovator, I had only a normal back ground to fall back; I am a native of Baramati, Maharashtra and hails from a farmer's family. I was aware of the problems of the farming community. Today when I look back, I was lucky to be brought up as part of the joint family in the Agri and rural setup in the small village.

Many people living in cities have spent their childhood in villages. Cold buttermilk in earthen pot, bullock-cart ride, having meal sitting under tree, hurda party, enjoying the evening breeze etc evokes nostalgia about the bygone

rural life. But unfortunately, people do not get time from hectic life to enjoy those things as modern day urban life does not give many outlets to enjoy village life. Those who have only read stories about village life in books are deprived of a pure joy.

To relieve the joy of farms and rural life and folk Agri Tourism has emerged as an option. It was a concept initiated in Baramati in the year 2004 and has become immensely popular in the last 6 years through Agri Tourism Development Corporation (ATDC).

Maximising returns from agriculture has been ATDC's message for the last several years. If an agrarian country like India is aiming economic development, it cannot afford to ignore rural development. ATDC began its efforts to realize the dream from Baramati village.

Naturally the first Agri Tourism center was set up in Baramati. Afterwards, ATDC, Pune took it upon itself to popularize this concept in every corner of Maharashtra. These efforts bore fruits and many such Agri Tourism centers

came up in a short span of time. Baramati's project has become role model now and Agri Tourism revolution has not only spread across Maharashtra but the entire country. ATDC takes pride in the fact that it was pioneer in the field of Agri Tourism in India.

Approximately 50000 urban and foreign tourists have visited Baramati center in the last 5 years and Pune district alone has seen 22 Agri tourism centers coming up taking by inspiration from the ATDC centre.

Mission

Our mission at ATDC is to promote agriculture tourism to achieve income, employment and economic stability in rural communities in India, and help boosting a range of activities, services and amenities provided by farmers and rural people to attract urban tourists to their area to provide opportunity for urban people to get back to the roots.

Many people living in cities have spent their childhood in villages. Cold buttermilk in earthen pot, bullock-cart ride, having meal sitting under tree, hurda party, enjoying the evening breeze etc evokes nostalgia about the bygone rural life



Agri Tourism Day

Now 16th May is being celebrated as 'World Agri Tourism Day' since 2008 in order to popularize the concept of Agri and Rural tourism across the globe.



We have initiated various activities in the last 5 years. ATDC has developed many Agri Tourism centers in

Maharashtra which blend rural lifestyle and modern needs. In short, ATDC is working at providing a complete tourism experience to tourists without fatigue.

Award

Let me mention that Agri Tourism India (ATDC) received the National Tourism Award as the Most Innovative and unique tourism Product category in the year 2008-2009. The award was presented by the Vice President of India in New Delhi on 3rd March 2010. ATDC has carved a niche for itself and brought Pune on the international agriculture map.

With a view to provide a common platform to various Agri tourism centers operating across the state, ATDC, Pune founded 'Maharashtra State Agri & Rural Tourism Co-op Federation Ltd.' (MART). This apex body, led by Mrs. Sunetra Ajit Pawar, has become the leader of Agri tourism sector in last 2 years.

India's countryside is blessed with nature's love—dense forests, high hills and deep valleys, many rivers flowing across the length and breadth of the country have made India nature a real paradise

Some 12 co-operative societies, 124 Agri tourism centers and more than 400 farmers have become members of MART, which in association with ASSOCHAM organized 1st National Agri Tourism Conference in New Delhi on 18th March 2010. The meeting appealed to directors of Agri tourism centers and people interested in Agri Tourism Concept in Maharashtra, farmers and professionals in the field of Agri Tourism.

India's countryside is blessed with nature's love—dense forests, high hills and deep valleys, many rivers flowing across the length and breadth of the country have made India nature a real paradise. But this has to be complimented by planned development in order to

generate employment. Acknowledging that traditional farming along with supplementary activities can generate tremendous employment, ATDC Pune has initiated various programmes and opened up a new avenue of employment for farmers by enabling producers to meet customers directly.

Farmers can sell their nutritious agro products in fewer prices by the elimination of middlemen. One can experience the fun behind eating sugarcane right there in fields or fruits just plucked from trees. Students can see poultry, Emus breeding, cattle breeding, honey collection centres etc and learn the work that goes behind these activities.

It has led to a speedy generation of employment since both customers' liking and farmers' need are being taken care of. Products like pickle and papad prepared by ladies savings group (*Mahila bachat gat*) are tourist's all time favorite and demand for such products as well as some other unique products are on the rise.

The government is working towards development of villages but it is the responsibility of every citizen to do something on our own. ATDC, Pune has definitely taken a step in this direction.

ATDC's various concepts and projects are being adopted worldwide due to United Nations World Tourism Organization's acknowledgement and National Tourism Award by Tourism Ministry, Government of India. This is helping in supplementing tourism activities to core agricultural activities for providing financial support to agriculture sector across the globe including India. Therefore this recognition and National Tourism Award is an important milestone in India's Agri Tourism development. ATDC is extremely proud to be instrumental in bringing about this change.

'Unless our villages are self-sufficient, our nation cannot progress. We must go to villages in order to achieve development of villages.' This *mantra* given by Mahatma Gandhi still holds true and ATDC is working to realize Gandhiji's dream.

** The writer is Director at Agri Tourism Development Corporation (www.agritourism.in), Pune*



Agricultural Performance in India:

Past Trends and Future Prospects

By Parmod Kumar*

The perception that India's agricultural sector in India (broadly defined to include forestry and fishing) has not fully absorbed the nation's growth transition in the recent past is a fact and corroborated by data here. It is true that agriculture has lagged behind when the rate of growth in other sectors of the economy had been rising. So the effort is to invoke an inquest looks at certain trends and traces the outlook for the future based on certain parameters.

The divergence in growth rates in general as well as agricultural GDP have persisted and had widened after the 2000 (Figure 2.1), even though the volatility in agricultural growth rates has fallen since then. The agriculture GDP growth rate peaked in the 1980s at above 4 percent while overall GDP grew at a rate of 5.6 percent during the same time period. Growth rate in agricultural GDP came down to 3.4 percent in the 1990s and further to 2.8 percent during the first 7 years of 2000s. In comparison, overall GDP jumped from 5.7 percent in the

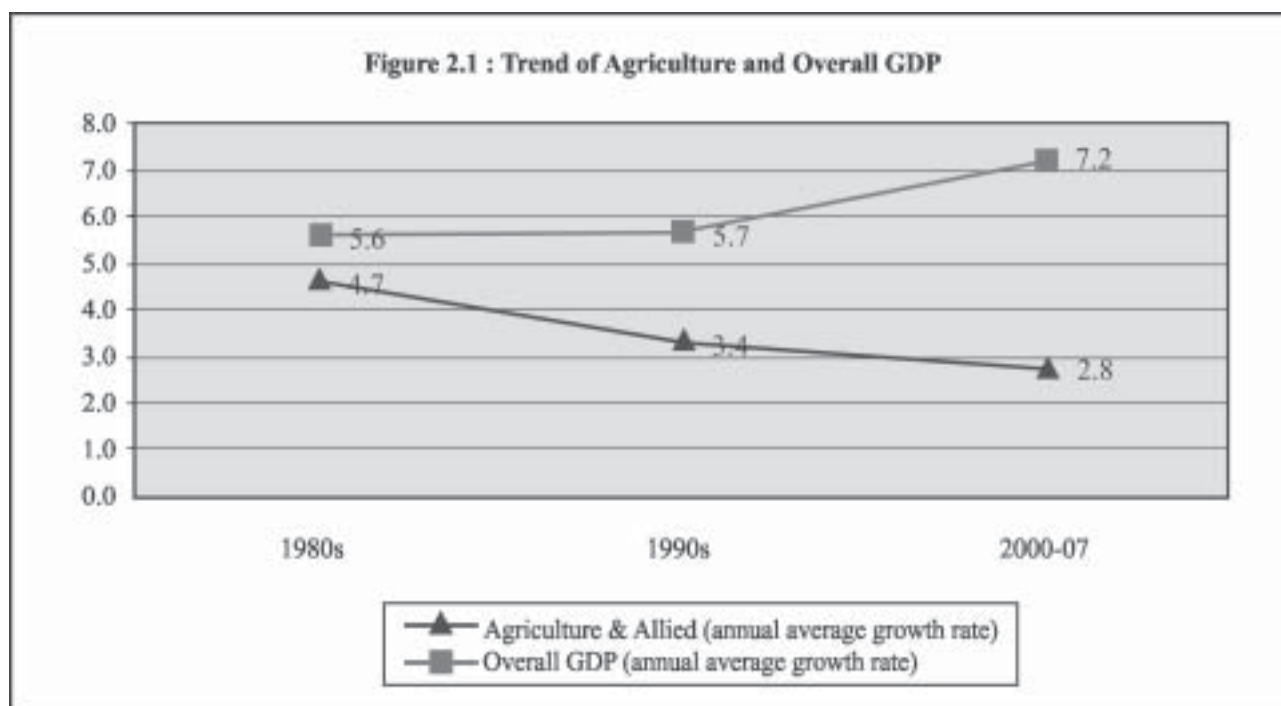
1990s to 7.2 percent during the same period in 2000s. Thus, while the overall economy accelerated, the agricultural sector decelerated and as a result the gap between the growth of agriculture (including the allied sector) and that of rest of the economy continues widening. This has led to steeper fall in the share of agriculture and allied sectors in the rest of the economy although no major changes have taken place in the employment structure.

Past performance in area, production and productivity

Indian agriculture has made great strides in providing food security for its people. The foodgrain production has increased from 130 million tonnes in 1980-81 to close to 230 million tonnes during 2007-08. However, barring the last two years' production trends of foodgrains in the post reform era, production of foodgrains hovered around 200 million tonnes for almost a decade beginning from 1996-97 to 2005-06. Production peaked at 210 million tonnes in 1999-00 and

further increased to 213 million tonnes in 2001-02. However, a severe drought in 2002-03 caused sharp fall in production to a new low of 175 million tonnes. The production recovery in the succeeding three years after drought was not spectacular. Because of exceptionally good harvest supported by normal monsoon in the year 2007-08 and 2008-09, the country achieved the 10th Plan targeted food grain production of 230 million tonnes. Among various crops, the most inspiring increase appeared in the case of coarse cereals whereby production increased from around 30 million tonnes in the mid 1990s to 40 million tonnes in 2007-08. Production of pulses still hovers around 14 to 15 million tonnes, the level India achieved around late eighties or early 1990s. In the case of oilseeds, the new peak achieved in 2007-08 was 28 million tonnes, the previous being 24 million tonnes achieved in 1996-97.

Deeper probing is needed at the state level to comprehend the factors responsible for good or bad performance



of different regions and crops during the last two to three decades. In the proceeding sections, we explore the trends in area, production and yield in the major states for cereals, pulses and oilseeds and the factors influencing these trends. The performance of agriculture is analyzed in terms of medium terms (trend) growth of area, production and productivity of cereals including wheat, rice and coarse grains, pulses and oilseeds during the 1980s (1980-81 to 1989-90); 1990s (1990-91 to 1999-00); and 2000s (2000-01 to 2006-07)^{1 2}. The whole period is also analyzed for the pre-reform (1980-81 to 1994-95) and post reform period (1995-96 to 2006-07). The results are discussed in the following paragraphs.

Effect of Liberalisation

Glancing through the growth rate statistics, foodgrain production increased at a rate of 2.7 percent in the 1980s, which decelerated to 2.1 percent in the 1990s and came down further to less than 2 percent in the first six years of 2000s. Growth rate was significant in the 1980s and 1990s but was insignificant in 2000s. The pre and post liberalization period makes a better comparison as it divides the whole period (1980-81 to 2006-07) into approximately two halves. The food grain production increased at

a significant rate of 2.8 percent in the pre-liberalization period which came down to 1.1 percent in the post liberalization, although significant but less than that of population growth rate.

Only Haryana, Punjab, Andhra Pradesh and West Bengal observed significant positive growth rate in production in the post liberalization period, while Kerala observed significant negative growth rate during the same time period. In comparison, in the pre liberalization period, all the major states observed significant and positive growth rate in the production of food grains. Even among the states that observed positive and significant growth rate in the post liberalization period, only in Andhra Pradesh growth rate was higher in the post liberalization period as compared to the pre liberalization period. In all other states, trend growth rate was lower in the post liberalization as compared to the pre liberalization period. Decline in production growth rate could be an outcome of either decline in area or decline in yield growth rate or that of both. The area trends of food grains present a very dismal picture not only for the post liberalization but for the pre liberalization period as well. During the whole period of 1980-81 to 2006-07, area under food grains observed

significant but negative trend growth rate -0.2 percent per annum. Thus, a shift in cropping pattern is taking place from food grains to non-food grains since the beginning of the 1980s. The shift is visible in almost all the states as hardly there is any state that observed significant positive growth rate in area under food grains during both pre as well as post liberalization periods.

Decline in Yield

Therefore, decline in production in the post liberalization in comparison to pre liberalization period was not caused by the decline in area but the sole reason was decline in the yield rate of food grains. This is evident from the trend growth of yield. During the pre liberalization period, food grains yield increased at 3 percent per annum. In comparison in the post liberalization, yield growth rate was only 1 percent. Almost all the major states observed significant and positive growth rate in yield in the pre liberalization period while in the post liberalization period, only Punjab, Haryana, Andhra Pradesh, West Bengal and Kerala observed significant positive growth rate. Even in these states, positive growth rate in yield was lower in the post liberalization period compared to pre liberalization period. The trends are further analyzed for food grain crops

OVER VIEW


to grasp the underlying changes occurring in area, production and yield in these crops.

Glancing through trends in area, production and yield in wheat, rice, coarse cereals and pulses, it is seen that there has been a declining trend of acreage for most of these crops during the post liberalization period. Area growth rate was insignificant in the post liberalization period in wheat, rice and pulses while it was significant and negative in coarse cereals. In comparison area growth was significant and positive in wheat and rice in the pre liberalization period while it was insignificant in pulses and significant with a negative sign in coarse cereals during that period. Statewide, only Punjab observed significant positive growth in rice while in the case of wheat, significant positive growth occurred in the traditional wheat producing states of Punjab, Mariana and Uttar Pradesh. In pulses, significant growth in area expansion occurred in Andhra Pradesh, Karnataka and Maharashtra while none of the states

experienced expansion in area under coarse cereals in the post liberalization period. For wheat and pulses, not only area but also yield stagnated in most of the states in the post liberalization period as trend growth in yield was found insignificant for these crops.

In the case of rice and coarse cereals, yield growth rate was significant and positive but the magnitude of the coefficient was almost half that of the pre liberalization period. State wise, yield growth in wheat during post liberalization period was positive and significant only in Haryana and Rajasthan. In the case of rice, West Bengal, Andhra Pradesh and Punjab and in pulses, Andhra Pradesh observed significant and positive growth rate in yield in the post liberalization period. However, silver lining was provided by the coarse cereals whereby significant and positive growth in yield was observed in Andhra Pradesh, Rajasthan, Haryana, Orissa, Madhya Pradesh, Punjab and Bihar in the post liberalization period.

Thus, given the lower growth trends in area and yield in the post liberalization period, the trends in production were also lower in the post liberalization period as compared to pre liberalization period. Production of wheat grew at a rate of 0.9 percent in the post liberalization period as compared to 3.7 percent in the pre liberalization period. Production of rice grew by 1.1 percent in the post liberalization period compared to 3.5 percent in the pre liberalization period. In pulses, growth rate in the post liberalization period was insignificant (0.7 percent) compared to 1.3 percent significant growth in the pre liberalization period. Only in coarse cereals production growth rate was significant and higher (1.5) percent in the post liberalization period as compared to insignificant (0.5 percent) growth rate in the pre liberalization period. Box 1 above provides the summary of production performance of different states during the 1980s, 1990s and 2000s based on their trend growth rate as explained above.



State wise, yield growth in wheat during post liberalization period was positive and significant only in Haryana and Rajasthan. In the case of rice, West Bengal, Andhra Pradesh and Punjab and in pulses, Andhra Pradesh observed significant and positive growth rate in yield in the post liberalization period

Position of different States in Production Growth of Various Crops

Period	Accelerating	Decelerating	Stagnating
Wheat			
1980s	Rajasthan UP, MP, Punjab, Haryana, Bihar	Maharashtra, Gujarat	Other States
1990s	MP, Rajasthan, Maharashtra, Other States	-	UP, Punjab, Haryana, Bihar, Gujarat
2000s	Rajasthan, Madhya Pradesh, Maharashtra, Gujarat	UP, Punjab, Bihar	Haryana, Other States
Rice			
1980s	UP, WB, Bihar, Orissa, TN, Punjab, India	-	Other States, Assam, AP
1990s	UP, WB, Bihar, Punjab, Other States	Orissa	AP, Assam, TN
2000s	MP, Orissa, Punjab	UP, Assam	WB, Bihar, AP, TN, Other States
Coarse cereals			
1980s	UP, Bihar, Karnataka, TN, Other States, Maharashtra	Gujarat, Haryana, AP, Punjab, Orissa	Rajasthan, Madhya Pradesh
1990s	Gujarat, Bihar, Haryana, AP, Karnataka	TN, Punjab, Rajasthan, Other States, Madhya Pradesh, Maharashtra, Orissa	UP
2000s	Bihar, Haryana, AP, Karnataka, TN, Rajasthan, Other States	Madhya Pradesh, UP	Gujarat, Punjab
Pulses			
1980s	AP, Other States, Madhya Pradesh, Maharashtra	Rajasthan	UP, Gujarat, Bihar, Karnataka
1990s	Karnataka, Rajasthan, Madhya Pradesh, Maharashtra	UP, Bihar, Other States	Gujarat, AP
2000s	Gujarat, AP, Karnataka, Rajasthan, Madhya Pradesh, Maharashtra	UP	Bihar, Other States

In oilseeds, India formulated an integrated policy under 'Technology Mission on Oilseeds' in 1986. From less than 11 million tonnes during 1985-86, the country attained an all-time record oilseed production of 24 million tonnes in 1996-97. It ushered in an era of yellow revolution. The mission later slowed down and oilseed production dropped to less than 15 million tonnes during the drought year 2002-03. There was slight recovery thereafter in the succeeding years and oilseeds production increased to 29 million tonnes during the current year. The growth statistics clearly indicate significant expansion in area under oilseeds during the 1980s and slow down in the 1990s but some recovery during the first seven years of 2000s. The growth rate in area under oilseeds during

the pre reform period was 3.2 percent and significant while it became insignificant during the post reform period. Almost all the major oilseed growing states had significant and positive growth rate in the pre liberalization period. In comparison, growth rate in area was significant and positive only in Maharashtra and West Bengal in the post liberalization period. The major states, e.g., Rajasthan, Haryana, Karnataka, Madhya Pradesh and Andhra Pradesh that had major expansion in area under oilseeds during the pre liberalization period observed insignificant (and even negative) growth in area during the post liberalization period.

Unlike area, yield growth rate was

observed positive during both 1980s as well as in the 1990s. However, yield growth of oilseeds was insignificant in the 2000s. During the pre liberalization period, yield growth rate was significant and its magnitude was 2.8 percent. In the post liberalization period due to shift in emphasis away from oilseeds once again yield growth rate remained insignificant. Statewise, yield growth rate was found significant only in Rajasthan and West Bengal during the post liberalization period whereas it was significant and positive in Uttar Pradesh, Haryana, Andhra Pradesh, Tamil Nadu, Rajasthan, Madhya Pradesh, Maharashtra and West Bengal during the pre liberalization period. Accordingly, production growth rate was above 5 percent in the 1980s, it came down to

2.3 percent in the 1990s and increased to 6.7 percent during the 2000s. Comparing pre and post liberalization periods, oilseeds production grew at a significant rate of 6 percent in the pre liberalization period, which accounts for the golden period of Technology Mission. The Mission completely collapsed in the post liberalization period when growth in production became insignificant and the magnitude of growth rate came down to less than one percent.

Shrinking Land Supply

Thus, trends in area clearly indicate constrains in availability of land for agriculture. Due to competing pressure on land demand for non-agriculture sector and rapid urbanization witnessed in the recent years, the possible increase in aggregate supply of land for the purpose of agriculture will not easily be foreseen. Vigorous effort is needed to covert fellow and waste land for cultivation and adequately compensate for the high productivity land getting released by agriculture sector for other

uses. There was a sharp decline in the growth rate of productivity of almost all the crops in the decade of 1995-96 to 2006-07 (post liberalization). The productivity growth of rice and wheat, the anchors of green revolution in the past, decelerated to 1.1 percent and 0.4 percent per annum, respectively from around 3 percent per annum in the previous decade. The productivity of pluses during 1995-96 to 2006-07 in the absence of any technological breakthrough remained almost at the same level without any significant growth rate. Only maize and bajra, among coarse cereals registered significant positive productivity growth during 1995-96 to 2006-07.

Trends in input usage

Indian agriculture is at crossroads as productivity of major crops has either declined or stagnated since the mid nineties. The constraints which agriculture sector is facing are numerous like imbalanced use of fertilizers, soil nutrient deficiency, depleting water

resources, problems of land degradation, agrarian distress, agricultural risks, spatial and temporal climatic aberrations etc. In this section, I analyze the holding size, cropping pattern and trends in input usage during the last two and a half decades to understand the reasons for the slowdown in the agriculture productivity and to chalk out the future strategy.

The average size of land holdings in India is less than one and a half hectares. Not only the size of holdings is small but they are also declining further incessantly. The average size of holdings was 1.7 hectares in 1985-86, which came down to 1.4 hectares in 1995-96 and further to 1.3 hectares in 2000-01. The size of land holdings was around 0.5 hectares in Bihar and half of that size (0.24 hectares) in Kerala during 2000-01. The size of land holdings is declining because of fragmentation caused by inheritance and also due to land ceiling acts and in some cases, family disputes.

Out of India's 116 million farmers,

The productivity of pluses during 1995-96 to 2006-07 in the absence of any technological breakthrough remained almost at the same level without any significant growth rate. Only maize and bajra, among coarse cereals registered significant positive productivity growth during 1995-96 to 2006-07



around 60 percent have less than one hectare and together they account for 17 percent of the land. The share of medium to large farmers (above 4 hectares) is very small at just over 7 percent of all holdings, but these farmers account for around 40 percent of the land. The implication is that many of the very small farms are subsistence holdings, with low investment and little productivity growth. Small size holdings are often over-manned, resulting in disguised unemployment and low productivity of labour. Adoption of modern agricultural practices and use of technology is greatly hampered leading to high costs in the case of small land holdings. However, there is a silver lining as the trend of falling holding size is reversed in agriculturally advanced states of Punjab and Haryana where the process of consolidation has already started and likely to be followed by Uttar Pradesh, Tamil Nadu and other fast developing states.

Irrigation Issue

Irrigation facilities in India are inadequate, as revealed by the fact that only 58.5 percent of the land was irrigated in 2004-05, which results in farmers still being dependent on rainfall. A good *monsoon* results in a robust growth for the economy as a whole, while a poor *monsoon* leads to a sluggish growth. Glancing through trend growth rates in irrigated area it was observed that the growth trends in percentage irrigated area were higher in the pre liberalization period than in the post liberalization among almost all the crops at the all-India.

The proportion of irrigated area of wheat in India increased by a 1.5 percent per annum during the pre-liberalization era compared to less than 0.5 percent during the post liberalization period. The respective figures for rice were 1.3 and 0.8 percent, and for coarse cereals 1.6 and 1.4 percent, respectively during the above mentioned two periods. Similarly, percentage irrigated area of pulses grew by 2.8 percent per annum during pre liberalization, which came down to 1.4 percent during the post liberalization period. The situation was even worse in oilseeds, whereby increase in percentage of irrigated area was negligible (insignificant) in the post liberalization period compared to above 5 percent per



annum increase during the pre liberalization period.

Thus, slowdown in the progress of irrigation among almost all the crops since mid nineties provides an eloquent explanation for the fall in productivity of these crops in the post liberalization era. The slowdown was across the board (among all the states) in wheat, rice, pulses and oilseeds. Only in the case of coarse cereals, a few states like Andhra Pradesh, Haryana, Madhya Pradesh and Maharashtra observed higher growth in the percentage of irrigated area during the post liberalization as compared to pre liberalization period¹. Consequent to slow down in irrigated area, growth rate in cropping intensity was also almost negligible at all-India as well as in most of the states during the post liberalization period.

The trends in terms of growth rates of consumption of total nutrients (fertilizer) per hectare was positive and significant in most of the states during both pre and post liberalization periods (Table 2.4.7). Comparing between these two periods, per hectare consumption of fertilizer at all-India grew at a rate of 6 percent per annum during the pre liberalization period compared to almost half of this growth amount during the post liberalization period. However, some of the states, e.g., Madhya Pradesh, Punjab, Uttar Pradesh and Assam observed a higher growth in fertilizer consumption

in the post liberalization period compared to pre liberalization. The phenomenal increase in fertilizer consumption during the current and last two years is reflected by a higher growth in the 2000s as compared to the 1990s for the all-India as well as majority of the states. These current trends indicate that it is possible that with the given lagged effect of fertilizer consumption on productivity, most of the Indian states might observe higher yield in the coming 2 to 3 years.

Loan Outstanding

According to the National Sample Survey, the outstanding loans per household (including non-institutional sources) increased from less than Rs. 2000 in 1992 to more than Rs. 7500 in 2002 at all-India level. State wise Kerala, Punjab, Haryana, Rajasthan and Gujarat exceeded Rs 10000 whereas West Bengal, Orissa and Bihar remained less than Rs 5000 per household. The increasing trends in the outstanding loans from institutional sources are indicated by data. The institutional loans increased by 13 percent in the pre liberalization period while they increased by more than 15 percent in the post liberalization period. Comparing 1990s with 2000s, the rate of increase was more than double in the latter period as compared to the former at the all-India basis. State wise also almost all the states observed significantly higher trend growth in the post liberalization period compared to

OVER VIEW

pre liberalization period. Similar to increasing trends in the use of fertilizer and institutional loans, the share of tractor, power tillers and use of electricity in agriculture for lifting water and other purposes has also increased in the post 1990s.

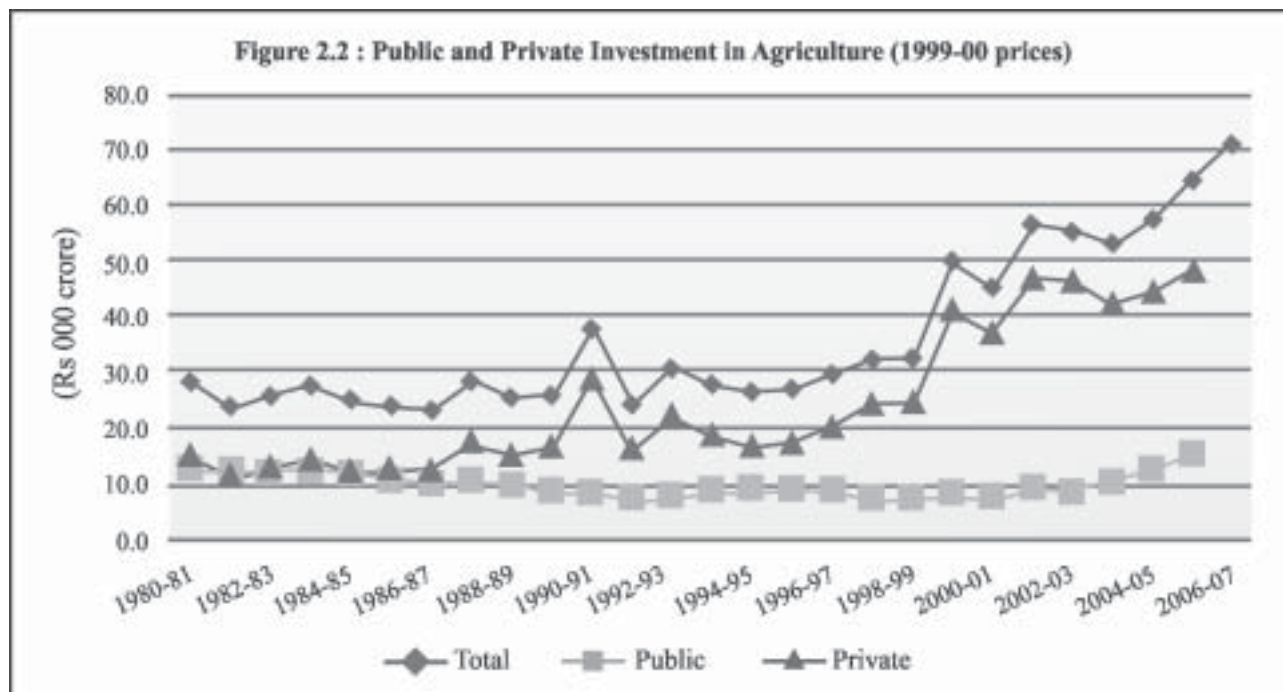
Glancing through trends in growth rate of public and private investment in agriculture at constant (1999-00) prices, one notices that trends in public

agriculture which has set a positive incentive for the private investment as well. As a result a rapid increase in public as well as private investment has occurred during the last four years as is depicted by Figure very clearly.

Future Prospects

Certainly Indian agriculture is at a turning point and there is a mood to apply correctives to arrest decline in as productivity of major crops. The

have witnessed a huge increase in per hectare consumption of fertilizers during the last decade. The increasing trend in the outstanding loans from institutional sources was also indicated by the data. The share of tractor, power tillers and use of electricity in agriculture for lifting water and other purposes has also increased in the post 1990s. Irrigated area might also increase following the recent increase in the public sector investment in agriculture sector. These



investment were negative in both 1980s as well as 1990s as is also seen from Figure 2.2. However, public investment started turning positive in the late nineties and it increased rapidly in the 2000s especially 2003-04 onwards. The public investment grew at an impressive trend growth rate of 12.8 percent per annum during the 2000s (six years for which data is available). Private investment in agriculture was positive throughout this period but trends were insignificant during the 1990s as well as first six years of 2000s. Trend growth rates in both public and private investment turn out much higher during the post liberalization period as compared to pre liberalization period. As a result of increasing concern shown by all stake holders to the falling productivity in agriculture, a complete U turn has taken place in the public investment in

constraints which agriculture sector is facing are numerous like imbalanced use of fertilizers, soil nutrient deficiency, depleting water resources, problems of land degradation, agrarian distress, agricultural risks, spatial and temporal climatic aberrations etc.

However, some reversal has taken place in the recent past as a result of spurt in the public investment in agriculture which has set a positive incentive for the private investment as well.

The consumption of fertilizers has also witnessed an impressive growth during the last three years, i.e., 2004-05, 2005-06 and 2006-07, after witnessing a slow and uneven growth in the preceding 4 years. The nutrient consumption per hectare was highest so far in 2006-07. It is interesting to note that agriculturally less advanced states like Bihar, Madhya Pradesh, Gujarat and Andhra Pradesh

are encouraging signs for the Indian agriculture and may sustain the positive tempo for the agricultural productivity.

¹ Data for area, production and yield for state level was available only up to 2006-07, although 4th advanced estimates of production were available, but only for the All-India level.

² For working out time growth rate following semi-logarithm trend equation was used:

$$\text{Logn } Y = a + b * \text{Time}; \text{ where } b \text{ represents trend growth rate.}$$

* The writer is Professor & Head at Agriculture Development and Rural Transformation Centre (ADRTC) and Institute for Social and Economic Change (ISEC) in Bangalore

Organic Farming Strengthens Soil Fertility

MOFF spearheads campaign among farmers in Maharashtra

By Vikram Bokey*

Maharashtra Organic Farming Federation, Pune (MOFF) is spearheading the people's movement of organic farming in the State. Already thousands of farmers have benefited by increasing their net income with improving productivity year after year in all types of crops under different agro-climatic zones of the state.

The fact is, the current theory of plant nutrition often fails in practical life. The experiments conducted by our farmers on all crops in all types of soils in Maharashtra confirm that under organic farming production does not go down even in the first year of conversion. Later, it improves year after year as the soil micro-flora gets developed. The immediate benefit to the farmer is a drastic reduction in the cost of cultivation as he does not have to buy anything from the market.

Alternative to Chemical farming

It affirms that the time has come to accept organic farming as a viable alternative to chemical farming as it will improve the farmers' net income and increase the soil fertility which has been badly affected due to the Green Revolution Technology.

A paradigm shift to organic farming is

the need of the day. You are aware that the SRI method of rice cultivation has proved, all over the world, that what the plant needs is moisture and not water with assurance of full sunlight, air and a living soil. We have to ensure that the microbes in the soil are increased by adding a fermented mixture of fresh cow dung, cow urine, jaggery and flour of dicots and a small quantity of soil from the border of the farm.

At the same time mulching by green or dry biomass ensures cover (i.e. protection from ultraviolet rays of the sun), moisture and food for the microbes. Mixed cropping, crop rotations, multiple cropping and trap crops ensure biodiversity, moisture preservation and growth of predators thereby controlling pests and diseases.

The main fear to large scale adoption of organic farming is based on the present "Soil is a bank of nutrients which can be depleted by use" theory i.e. the NPK theory of plant nutrition. We offer a new theory "Living soil theory" and request all to appreciate "the power of micro-organisms." Two papers presented by us at the 'Winter School on Organic Farming' held last year at the Dr. Punjabrao Deshmukh Agriculture University at Akola were highly

appreciated by the professors from 16 agriculture universities who attended the school for 20 days.

Early Transition

In the initial stages of conversion to organic farming, it may be useful to add bio-fertilizers and use bio-pesticides over a period of 2-3 years but once the fertility of the soil is improved none of these are required. We wish that you visit Maharashtra and see for yourself how this peoples' movement has succeeded on thousand of acres of farms belonging to resource less small farmers.

We suggest that the National Policy on promotion of organic farming should include wide publicity, farmers' visits to successful organic farms, creation of model farms in every block of every district, publicity, farmers' visits to successful organic farms, creating of model farms in every block of every district, publicity of literature in local languages, use of CDs, other visual media, and mainly wholehearted support to the movement without fear of any drop in productivity.

** The writer Chairman of Maharashtra Organic Farm Federation (MOFF) based in Pune and a former IPS officer*

JATROPHA FARMING

Jatropha can Thrive as Interim Crop

The writer sees big potential in India and argues for including Jatropha in Horticulture Mission for better returns

By S.A. Alagarsamy*

We face many global issues today including economic meltdowns and climate change. The desire to emerge as one of the top economies of the world is driving our growth. And we are constantly worried about global warming and environmental degradations due to rapid industrialization in urban areas and migration of rural talent to cities for employment leaving the farm sector high and dry.

In my own case, I spent my early years in a village where agriculture was the main occupation for my family of seven members. But my father suddenly abandoned agriculture due to famine in 1952 and sent me to college for higher studies and this led to my leaving my farms and my ancestral lands. Luckily, I have one hectare still in my control with Green bamboos and Jatropha and pongamia trees in Sivakasi—a major town. I too migrated to city.

Rising Oil Prices

The constant rise and fall of crude oil from US\$ 10 to US\$140 at peak period

have made us to search for alternatives to sustain our agriculture growth and energy needs. The time has come to look into non-edible oil sources like Jatropha, Pongamia and Paradise tree oils. In 2003, massive advertisements were put up calling for entrepreneurs of Jatropha in many states by the Planning Commission of India. Jatropha plantations were flashed in media “Under Waste land Development”. President Kalam supported this mass greening movement. But for a strong Biofuel Policy at the Centre this promotion did not happen and has not yielded many millions of acre under Jatropha plantations in India.

New Momentum in 2010

So Jatropha never took off. British Company Di Oils came to India. German Company Daimler is still active in Jatropha plantations and so do many others. Year 2010 has changed the Jatropha Farming in India to dramatic levels; our Prime Minister Dr. Manmohan Singh has declared 20 percent mandatory mixing of Bio Oils with Fossil Oils before 2017. Hence a fresh life or lease has been given to Atrophy plantations in India.

Jatropha Curcas is known to our rural farmers and not new. In Tamil Nadu, the Mettupalayam area has original native Jatropha trees giving good yields. In 2006, I personally cleaned up 1000 Acres in Tamil Nadu and in 200 acres, were planted Jatropha. Unfortunately there was no policy at government level. So the Biotech Company which has promoted this with a capital investment of more than Rs 5 crores have stopped the plantations, and their ambition to become number 1 in Jatropha has faded away. Even today the plantations are still in the fields but not maintained.

Now in Tamil Nadu, Emami BioTech has the beautiful Jatropha Plantation along with many farmers in spite of government’ neglect to promote it along with Hoticulture.

Company from Japan

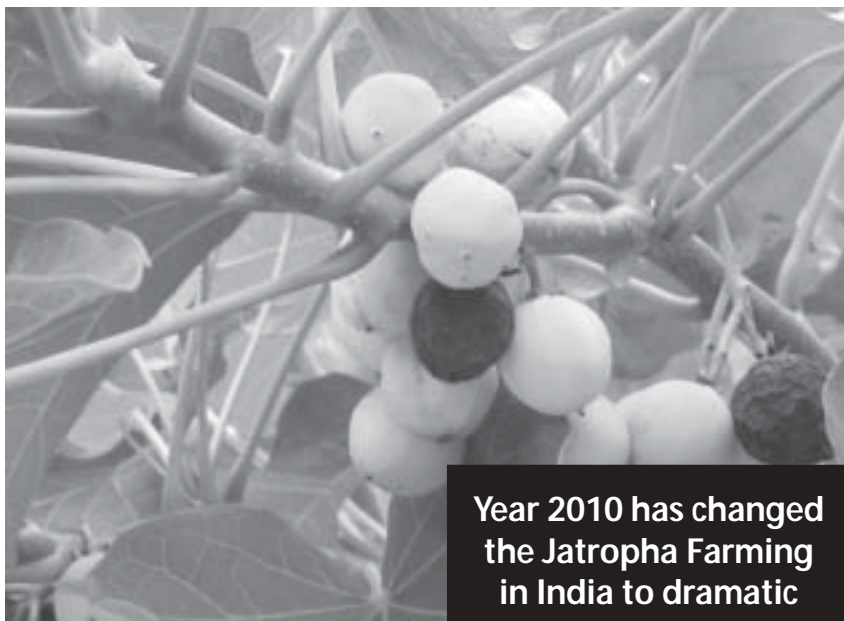
Now ACS Alternative Fuels Pvt Ltd., a 100 percent Japanese Company has entered Tamil Nadu and established an oil mill to process Jatropha Oil from June 2010.

ACS Alternative Fuels, is a 100 percent Japanese company which came to India

and incorporated as Private Ltd with the main aim to produce Jatropha oil and process Oil cake as pellets so that their oilcake pellets can be used for biomass feed stock and supplied as bio-fertilizer and feedstock, as Biochem, in the continuous process of clean burning as coal in the production of power.

Allied Carbon Solutions Private Ltd., is a leading corporate of Japan and has presence in the trade of Carbon and has offices throughout Cambodia, Columbia and USA.

ACS convened a farmers' meeting at Sivakasi in March 2010 and gauged their interest in growing Jatropha as alternative crops. More than 1000 farmers came forward to provided they are supported properly.



Year 2010 has changed the Jatropha Farming in India to dramatic levels; our Prime Minister Dr. Manmohan Singh has declared 20 percent mandatory mixing of Bio Oils with Fossil Oils before 2017



Benefits

Jatropha farming in Black soil lands of Red Soil lands give good results provided we put water and maintain it constantly. Intercrops like cereals, black-gram, green pulses of vegetables, fruit trees and bamboo plants have introduced 'Precise farming' and when combined with this, the results could be very good.

Neglect is Harmful

The Agriculture Department still has not recognized Jatropha as a Horticulture item to be grown as oil seeds. Without this, farmers will not get benefits like 65 percent subsidy in Drip irrigation and hassle-free bank loans. So I request the Agriculture minister to look into this matter expeditiously. The growth of multi-billion dollar Jatropha Industry in India will not happen otherwise. The Government of India should look out for more Agri and Biotech graduates to be appointed in commercial banks and help the concerned farmers.

** The writer is India representative of Allied Carbon Solutions Private Ltd., from Japan which is into Jatropha farming*

Indian Dairy Sector: Market Efficiency is the Key

By Dr. R.S. Khanna and Sharad Gupta*

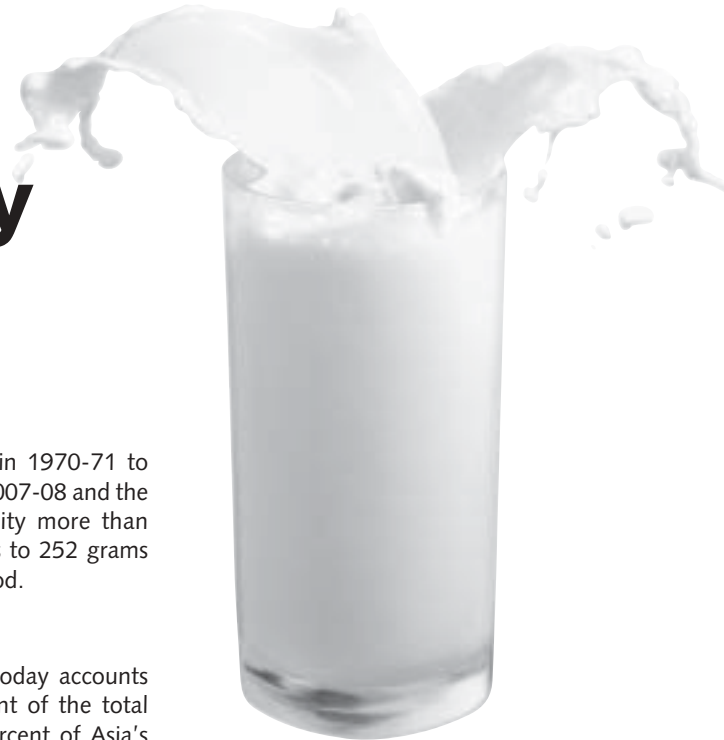
India is among the world's largest and fastest growing markets for milk and milk products. The development and growth of dairy sector in India has been fascinating. In a period of four decades, India catapulted from a milk deficit to a milk sufficient nation. During the 1950s and 1960s, 43 percent of milk solids in the total throughput of dairy industry were imported. The commercial import of milk powder touched its peak in 1963-64. This made the policy makers worried and led to the launching of "Operation Flood" programme in 1970 by the National Dairy Development Board (NDDB) and was supported by Technology Mission on Dairy Development in 1989.

These programmes resulted in spectacular growth of milk production —

from 22 million tonnes in 1970-71 to 104.8 million tonnes in 2007-08 and the per capita milk availability more than doubled from 112 grams to 252 grams per day in the same period.

India is Cost Efficient

India's milk production today accounts for more than 15 percent of the total world output and 40 percent of Asia's total production. It continues to grow at about 4 percent per annum far exceeding the global average of 1-2 percent in recent years. Also, India's milk production economy is based on conversion of agro by-products and opportunity labour. Therefore the cost of milk production in India is among the lowest in the world, making it globally price competitive without any subsidy.



The global milk output growth remains slow. According to the FAO Food Outlook (Global Market Analysis) released in June 2009, world production of milk was estimated to be around 688 million tonnes in 2008, about 1.7 percent higher than the previous year. Recent milk production estimate for 2009 is 699 million tonnes, 1.6 percent more than last year. This growth is below the global trend rate of 2 percent annually, which prevailed in the previous decade. Milk production is now expected to rise by 3.5 percent in Asia to 256 million tonnes. Output in developing countries may reach 337 million tonnes, virtually counting for all the additional global output, as milk production in developed countries is anticipated to remain largely unchanged. Consequently, the share of developing countries in world milk production is expected to rise to over 48 percent, up from a 40 percent share ten years ago and 32 percent at the start of the 1990s.

Complimentary Role

The livestock sector is playing an important role in achieving the targeted agricultural growth in India. According to estimates of the Central Statistical Organisation (CSO), the value of output from livestock sector at current prices during 2007-08 was about 29 percent



of the total value of output of the agriculture and allied sectors. Two-thirds of this was contributed by the milk sector alone. The livestock sector has been contributing over 5 percent to the total GDP. A target of 6-7 percent growth per annum for the livestock sector with milk group growing at a rate of 5 percent has been set during the 11th Five Year Plan.

India's Dairy Market

Over half of India's total milk production is consumed in urban India. The urban population is projected to cross the 400 million mark by 2011. The expected rise in the purchasing power of this growing urban population would boost the dairy market. Presently, some 1,500 out of 5,000 cities and towns in India are served by milk distribution networks. Rising awareness about hygiene standards and preference against loose milk has prompted the urban consumer to switch to pasteurised packaged milk — a demand of some 140 million litres per day, expected to double in the next five years.



The food service institutional market is growing at double the rate of the consumer market. There is increasing consumption of 'away-from-home' food. The concept of parlours is opening new vistas for ready-to-serve dairy products. There is a growing market for dairy products as ingredients in pharmaceutical and allied industries. As per recent trends,

a boom for dairy products is forecast in the defence market.

According to the five-yearly expenditure survey conducted by the National Sample Survey Organization (NSSO), the consumption of livestock products, particularly milk, has gained popularity in the last two decades, both in the rural and urban areas.

Market Size

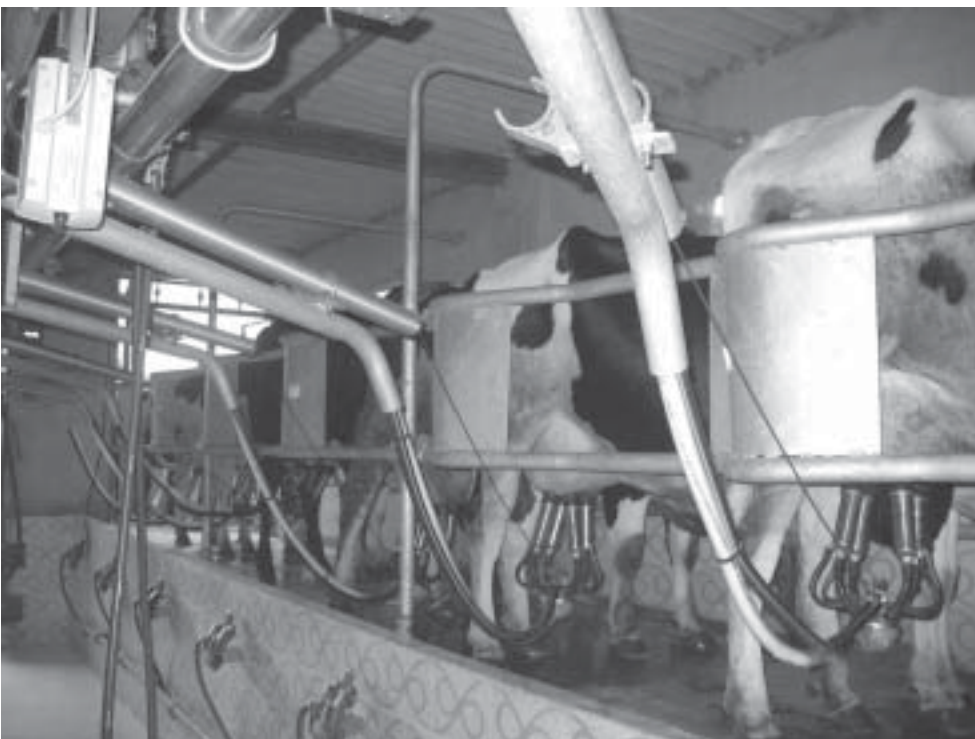
India's dairy market is multi-layered, shaped like a pyramid with the base made up of the vast market for low-cost, liquid, raw milk. The narrow tip at the top is a small but affluent market, largely for western-type and fresh packaged dairy products.

The domestic market for value added products like butter, cheese, ice cream, dairy whiteners and spreads is galloping at 8-10 percent per year. The current annual estimated market for western type dairy products is: butter 60,000 tonnes; branded milk powders: 27,000 tonnes; ghee in small packs: 40,000 tonnes; cheese: 13,000 tonnes and infant foods: 125,000 tonnes. The butter and cheese market is growing between 8 percent and 10 percent annually; the infant food market is expected to grow at 10-15 percent. Increased consumption of pasteurised packed liquid milk is likely to retard the growth of branded milk powders.

Traditional Milk Products

Through millennia, Indian sweet delights have gone through waves of innovations, both in product formulations and

Over half of India's total milk production is consumed in urban India. The urban population is projected to cross the 400 million mark by 2011



The handbook on “Technology of Indian Milk Products”, published by *Dairy India*, is a testimony to the significant R&D work done in this field that has resulted in production indigenous milk products on an industrial scale

processing by unsung master-confectioners. Traditional methods of ethnic sweet making are now being integrated with modern culinary technology. In the last two decades, scientists at R&D centres in India have used quarg separators and scraped-surface heat exchangers to pasteurize and process ‘shrikhand’, a fermented dairy dessert. Meatball-portioning machines and industrial fryers make ‘gulabjamuns’, fried balls of milk powder mixed with wheat flour. Japanese pastry-making machines and planetary mixers make ethnic delicacies.

The handbook on “Technology of Indian Milk Products”, published by *Dairy India*, is a testimony to the significant R&D work done in this field that has resulted



in production indigenous milk products on an industrial scale.

India’s first plant to make traditional dairy foods went into production in 1981 in Vadodara, Gujarat, in Western India (Sugam Dairy of the Baroda District Cooperative Milk Producers’ Union Ltd). Since then, a large number of dairy plants have taken to the production of Indian

delicacies and specialties. Presently, the annual production of traditional sweets in India is estimated at three million tonnes, valued at Rs 70,000 crore. Branded ethnic dairy products like sweets, paneer, curd, etc, are witnessing rising demand and increased acceptance, especially among urban consumers. The success of the branded curd, flavoured milk variants like ‘Amul Kool’ and traditional sweets like shrikhand, gulabjamun, rasogolla, peda, burfi and several other combinations with added fruits, dry fruits, chocolates, etc, from Amul, Mother Dairy, Nestle, Britannia, Bikanervala, Haldiram, Chitale, K.C. Das and the like, are gaining strength in national and international markets.

Growth Graces Organised Sector

As per Government of India’s Economic Survey for 2008-09, about 80 percent of milk produced in the country is handled in the unorganised sector and the remaining 20 percent is shared equally by cooperative and private dairies. Industry sources however maintain that between 22-24 percent of India’s milk output is handled by the organised sector and this is expected to increase significantly in the coming years. However, it is not clear whether the cooperative sector or the private sector



Table 1: Estimates of annual milk production and per capita availability, statewise, 2007-08.

States/UTs	Milk	
	Production ('000 tonnes)	Per capita availability (grams /day)
Andhra Pradesh	8,925	299
Arunachal Pradesh	50	114
Assam	752	69
Bihar	5,783	170
Chhattisgarh	866	101
Goa	58	100
Gujarat	7,911	387
Haryana	5,442	632
Himachal Pradesh	874	367
Jammu & Kashmir	1,498	337
Jharkhand	1,442	133
Karnataka	4,244	204
Kerala	2,253	181
Madhya Pradesh	6,572	262
Maharashtra	7,210	186
Manipur	78	82
Meghalaya	77	83
Mizoram	17	47
Nagaland	45	57
Orissa	1,625	112
Punjab	9,282	962
Rajasthan	9,536	408
Sikkim	49	225
Tamil Nadu	5,586	231
Tripura	91	72
Uttar Pradesh	18,861	273
Uttarakhand	1,221	355
West Bengal	4,087	128
Andaman & Nicobar Islands	24	159
Chandigarh	47	121
Dadra & Nagar Haveli	5	53
Daman & Diu	1	15
Delhi	282	46
Lakshadweep	2	86
Puducherry	46	119
All India	104,840	252

Sources:

Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, Government of India, New Delhi.

State Departments of Animal Husbandry, Veterinary Services & Dairy Development.

will have a larger share. All the planning that goes for increasing productivity, procurement, processing and marketing will have a tremendous bearing on this aspect.

Milk Processing

Under the Milk and Milk Products Order (MMPO) 1992, the Central and State Registration authorities have registered 865 dairy units with combined milk processing capacity of 88.66 million litres per day in the government, cooperative and private sectors as on March 31, 2009. MMPO has been subsumed as Milk and Milk Products Regulation under Section 99 of the Food Safety and Standard Act 2006 and it is now being implemented by the Food Safety and Standards Authority of India (FSSAI) which is administered by the Ministry of Health & Family Welfare.

Significant changes are expected in the livestock population structure, institutional arrangements and the organisation of livestock production. The declining trend in the population of bullocks and non-descript cows will gather momentum. Crossbred cows and buffaloes will contribute increasing share of dairy production.

Milk as A New Crop

The future strategy for growth would have to treat milk as any other crop and dairy farming as an agricultural activity in its own right. Farmers may well be required to consciously grow fodder and invest in the productivity of their animals to bring down the cost of producing milk. But that cannot happen unless they have the incentive to do so, which the currently dominant systems of milk marketing certainly do not provide.

Managing Volatility

Managing volatility in milk markets will be central to the success and viability of any dairy farm over the next 10 years. To achieve maximum benefits, the entire dairy sector, both the cooperatives and private entrepreneurs, would need to invest in a rural milk procurement network and reduce its dependence on intermediary milk collectors and transporters. Private dairies, with rare exceptions, are following a procurement model that leaves milk collection to contractors and local agents.

Table 2: Top 12 States in milk production, 2007-08.

States/UTs	Milk Production ('000 tonnes)	Percentage to total milk production(%)
Uttar Pradesh	18,861	17.99
Rajasthan	9,536	9.10
Punjab	9,282	8.85
Andhra Pradesh	8,925	8.51
Gujarat	7,911	7.55
Maharashtra	7,210	6.88
Madhya Pradesh	6,572	6.27
Bihar	5,783	5.52
Tamil Nadu	5,586	5.33
Haryana	5,442	5.19
Karnataka	4,244	4.05
West Bengal	4,087	3.90
Total (Top 12 States)	93,439	89.13
ALL INDIA	104,840	100.00

Sources:

Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, Government of India, New Delhi.

State Departments of Animal Husbandry, Veterinary Services & Dairy Development.

Publishers of Dairy India, New Delhi.

Table 6: Value of export of livestock and livestock products, 2005 to 2008.

(Rs. million)

Broad Groups	2005-06	2006-07	2007-08
Livestock	265.45	429.42	412.25
Meat and Edible Meat Offals	27,294.72	32,976.37	37,384.56
Dairy & Poultry Products and Honey	11,067.75	8,073.99	13,873.93
Animal Fodder and Feed	844.48	976.77	1,030.90
Raw Hide and Skins & Leather	28,513.14	33,581.77	33,833.06
Raw Wool and Animal Hair	28,556.16	25.19	23.76
All Groups (Total)	96,541.70	76,063.51	86,558.46
India's Total Export	4,564,178.69	5,717,792.65	6,558,635.20

Source: Directorate General of Statistics & Commercial Intelligence, Kolkata (DGCIS, Kolkata).

Out of the total milk production, 77 percent is sold as liquid milk, with the balance of 23 percent converted into products. Dairy India foresees the organised sector growing tremendously and by 2011, the size of the Indian dairy industry is expected to more than double to Rs 520,000 crore

To meet the quality requirements, this situation has to change. Proper institutional mechanism connecting farmers to dairies and further to consumers is needed. Today, more and more private sector companies are setting up infrastructure for direct procurement and closer links with the farmers. Cost inefficiency apart, the outsourcing model is not amenable to proper quality control by the processor. Farmers must receive remunerative prices, which the outsourcing model certainly does not provide, so that will have incentive to produce and supply more milk to dairies.

Prominent Players

Some big names in India, such as Reliance, ITC, DCM, Bharti, Coca-Cola and PepsiCo, are silently working on a big gulp of the country's milk industry. Yakult-Danone has already made their debut. With the recent acquisition of Cadbury by Kraft, the Indian dairy market can expect some new action.

Dairy India 2007 (sixth edition), the most comprehensive and reliable data compendium of the country's dairy sector since 1983, reckons the size of India's dairy sector in 2005 at Rs 227,340 crore (valued at consumer prices). The largest contributor to this is liquid milk (at Rs 82,835 crore), followed by ghee (Rs 22,980 crore), *khoa/chhana/paneer* (Rs 24,100 crore), milk powder (Rs 4,680 crore), table butter (Rs 770 crore), cheese/edible casein (Rs 975 crore) and other products such ethnic sweets, ice-cream, etc (Rs 9,100 crore).

Liquid Milk Leads

Out of the total milk production, 77 percent is sold as liquid milk, with the balance of 23 percent converted into products. *Dairy India* foresees the organised sector growing tremendously and by 2011, the size of the Indian dairy industry is expected to more than double to Rs 520,000 crore.

This growth represents an opportunity for multinational food and dairy companies as well as input suppliers to expand their exports, facilitate technology transfer, sign new joint ventures and make profitable investments in India. The challenge would be to focus on: quality, product development and global marketing. The

1 crore = 10 million; 10 crore = 100 million;

1 billion = 100 crore = 1000 million.

Table 7: Value of import of livestock and livestock products, 2005 to 2008.

(Rs. million)

Broad Groups	2005-06	2006-07	2007-08
Livestock	91.36	140.24	300.99
Meat and Edible Meat Offals	19.83	15.03	29.67
Dairy & Poultry Products and Honey	410.81	1,153.15	710.01
Animal Fodder and Feed	2,145.63	2,336.48	2,992.06
Raw Hide and Skins & Leather	13,229.08	16,766.63	17,472.87
Raw Wool and Animal Hair	9,134.27	10,848.61	11,018.09
All Groups (Total)	25,030.98	31,260.14	32,523.69
India's Total Import	6,604,088.93	8,405,063.30	10,123,117.01

Source: Directorate General of Statistics & Commercial Intelligence, Kolkata (DGCIS, Kolkata).

Table 9. World dairy market at a glance, 2007-09.

	2007	2008 (estimate)	2009 (forecast)	Change: 2009 over 2008
	(million tonnes milk equivalent)			(percentage)
World Balance				
Total milk production	676.1	687.7	699.0	1.6
Skim Milk Powder (SMP)	24.1	24.6	25.0	1.6
Whole Milk Powder (WMP)	30.8	31.6	32.1	1.6
Butter	60.3	62.3	64.0	2.7
Cheese	85.9	87.9	89.8	2.2
Other products	475.1	481.3	488.0	1.4
Total trade	39.4	39.7	39.4	-0.8
Supply and Demand Indicators				
<i>Per caput food consumption</i>				
World (kg/year)	102.4	103.1	103.6	0.5
Developed countries (kg/year)	245.4	246.9	249.6	1.1
Developing countries (kg/year)	64.0	65.5	66.9	2.1
Trade – share of production (%)	5.8	5.8	5.6	
	2007	2008	2009	Change: Jan-May 2009 over Jan-May 2008 (percentage)
FAO Dairy Price Index (2002-2004 = 100)	212	220	119*	-52

*January-May 2009

Source: FAO Food Outlook (Global Market Analysis), June 2009.

industry would concentrate efforts on human resource development, R&D in milk products, equipment technology and emphasis on exports.

Government Programmes

The efforts of the Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture under the Government of India are concentrated on promotion of dairy activities both in Operation Flood and non-Operation Flood areas with emphasis on building up cooperative infrastructure, revitalisation of sick dairy cooperative federations and creation of infrastructure in the States for production of good quality milk and milk products.

For pursuing these objectives, the Department is implementing various development schemes — Intensive Dairy Development Programme (IDDP); Strengthening Infrastructure of Quality & Clean Milk Production; Dairy Venture Capital Fund; Feed & Fodder Development Scheme; and, Livestock Health & Disease Control Programmes.

In addition, a major programme for genetic improvement, the National Project for Cattle and Buffalo Breeding (NPCBB), was launched by the Department in October 2000 to be implemented over a period of 10 years in two phases of five years each and provides 100 percent grant-in-aid to implementing agencies. The NPCBB envisages genetic upgradation and development of indigenous breeds on priority basis. At present, 28 States and one Union Territory are participating in the project. Financial assistance of Rs 504.73 crore had been released up to July 31, 2009. Semen production in the country has increased from 22 million straws (1999-2000) to 46 million straws (2008-09) and the number of inseminations has increased from 20 million to 44 million during this period. As per the impact analysis report submitted by NABARD, overall conception rate has increased from 20 percent to 35 percent.

National Livestock Policy (NLP)

The policy for development of dairying is a part of the National Livestock Policy (NLP) that is being finalised by the Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture. The policy aims to encourage

dairy and livestock development through small holders, enhance participation of women, improve the productivity of livestock, augment feed and fodder resources, control and eradicate communicable animal diseases, expand capacities of milk handling in the organised dairy sector, improve quality to meet international standards of food safety, conserve animal bio-diversity and protect indigenous breeds of livestock, focus on R&D to improve products and productivity and ensure transmission of improved technology and management practices to the doorstep of farmers.

The breeding policy for cattle and buffaloes will focus on improving their performance by encouraging formation of breeders' associations. Characterised and threatened indigenous breeds would be conserved. The new technologies of Embryo Transfer and Open Nucleus Breeding System, biotechnology and genetic engineering will be applied.

Synergy Among Sectors

The proposed National Livestock Policy also aims to strengthen milk production, procurement and processing facilities by synergising the cooperative and private sectors. Focus is to shift to organic farming, product diversification with value addition, product quality and food safety. The government is also exploring to corporatising its facilities through public-private participation and through a mission-mode approach. Emphasis would also be on strong legislative back up to prevent, control and eradicate Foot and Mouth Disease and other bacterial, viral and parasitic diseases having major impact on productivity. Through these policies the government aims to unfold a series of national plans for increasing milk production and controlling the epidemics. A massive programme to eradicate Foot & Mouth Disease (FMD) with an investment of Rs 7,000 crore is also being formulated by the Government of India.

National Dairy Plan

The National Dairy Development Board (NDDB) has prepared a National Dairy Plan which aims at meeting the projected demand of about 180 million tonnes of milk by 2021-22. With an estimated outlay of about Rs 17,371 crore, the Plan has three major components — enhancing milk production through increased productivity; substantially



strengthening/expanding the infrastructure for procurement, processing, marketing and quality assurance through existing institutional structures and by promoting new ones; and, human resource development.

The NDDB is also focusing on increasing the milk production through better genetics. It has entered into collaboration with various institutions to produce a specified number of high genetic merit bulls for the entire country through progeny testing programmes for five breeds — Murrah, Mehsana, pure Holstein Friesian (HF), HF crossbred and Jersey crossbred.

As feed accounts for about 70 percent of milk production cost, NDDB has initiated steps to intensify the dissemination of various technologies that add value to feed and reduce the cost of milk production. The project included ration balancing advisory services at village level.

The NDDB has also set up a Centre for Analysis and Learning in Livestock and Food (CALF) at Anand. It offers a range of reliable and accurate analytical services for food and feed and diagnostic services for genetic disorders and animal health. It also conducts training programmes in food and feed analysis.

Reforms to Help Primary Producer

The dairy cooperatives in India have thrived not only on their inherent strength but also on the policy support they have rightfully received from the Central and State Governments. Market reforms are needed in the cooperative sector. Dr R.P. Aneja, one of India's most respected dairymen, wrote in *Dairy India 2007 (sixth edition)*: "The backbone of the Indian dairy sector is cooperatives. These need to be unshackled from the non-business baggage that they carry so as to be competitive and more professional. The non-business baggage includes the one-member, one-vote norm irrespective of the business contributed. This needs to be revisited. The restrictions on the primary village cooperatives to sell their milk only to the next tier of the system have tied up the milk producers against the trends of today's market-oriented economy that expects greater freedom. Market reforms must help the primary milk producers. The form must be dictated by the content which in this case is the value that is brought to the primary milk producers. By implication, the village cooperatives should be able to sell milk to the highest bidder, on a sustainable basis, cutting across the milkshed lines. This would lead

to greater competition and flexibility in the milkshed concept that is very necessary to maintain the viability of the primary village cooperatives. One of the important achievements of the dairy cooperative movement in India is that even now bulk of the milk cooperatives at the village level are still viable irrespective of the profitability of the Unions/Federations. These are the backbone of the milk cooperative structure and this character of the milk movement needs to be nurtured on a mission mode”.

Second White Revolution

What is needed today is a second White Revolution and that too in half the time taken by the first. Keeping this in mind, all stakeholders in the Indian dairy sector should welcome and support the developmental approach proposed by the NDDB through its National Dairy Plan. It is this investment which will lead to increase in per animal productivity and meet the projected requirements of milk in the country as well as enhance the share of milk handled by the organised sector. In the coming years, Indian dairy

products will have to compete not only globally but with the imported products in the domestic market as well.

PS The tables have been selectively used. Hence the serial numbers are not in the same sequence.

** Among the writers, RS Khanna is an International Dairy Consultant and Director General of Ganesh Scientific Research Foundation, New Delhi and and Sharad Gupta is the Editor and Publisher of Dairy India, New Delhi*

CARD Organizing Agri-Tech 2010

Andhra Pradesh is a 'happening state' today, known for its progressive policies and full of developmental initiatives. Agriculture is the backbone of the livelihood of over 60% of the State's population, is all set to receive a new deal from the Government which has committed to formulate a comprehensive package for reforms and policy changes vital for increasing farm income and productivity, thereby making the sector nationally and globally competitive. Hyderabad is the Agricultural Capital of India, with the presence of large number of agricultural institutions in the city. It is also the Seed Capital of the country with an estimated 60% of the commercial seed production taking place in the state. The state accounts for the highest consumption of agro chemicals and is a large market for seeds, fertilizers, rural credit, farm machinery and irrigation systems. It is amongst the highest producers of poultry, aquaculture, dairy products and horticulture.

Seeing the potential to serve and connect with the agrarian populace in a befitting manner, Centre for Agriculture and Rural Development (CARD) has planned to organize Agitech2010 at ANGRAU campus, Hyderabad on the dates of 15- 18th June, 2010. The event will witness agri exhibitions, concurrently with seminars on the topics of interest for the state farm sector. CARD is a leading national level organization, involved in dissemination of information, policy advocacy, technology transfers and investments promotion in agriculture and rural sectors. CARD also work at grass-root level with rural people through participatory approach as well as provides platform to the stake-holders in agriculture and agribusiness sector

by organising seminars, conferences, farmers workshops, entrepreneurs meets, agro exhibitions and technology fairs on various aspects of agriculture and rural development.

CARD has successfully organized largest number of agro-expositions in India since its inception. ASSOCHAM is the co-organiser of the AgriTech and it has been supported by Government of Andhra Pradesh, Ministry of Agriculture, GOI and Ministry of Food Processing, GOI. AgriTech 2010 would offer a great marketing opportunity for the participants to showcase products, services and technologies to potential buyers and users. This would also help establish contacts with the government agencies and prospective investors, identify business opportunities and forge strategic alliances with agribusiness companies. The event would provide a unique opportunity for the agribusiness companies to exhibit their products and directly communicate to a large number of potential customers, government officials and business associates.

AgriTech seeks to provide exposure to farmers about latest agri-input products, new technologies, farming practices, government schemes and scientific knowledge, which would help them raise agricultural productivity and improve produce quality through adoption of modern farming practices. The government of Andhra Pradesh has plans to bring in large number of progressive farmers to the event from different parts of the state. An extensive publicity and promotional campaign is planned to create awareness among farmers about the AgriTech 2010.

AGRI NEWS

Grow Pomegranate and be a Millionaire

Farmers in some of Maharashtra's driest districts boast of more than Rs 1 crore in their bank accounts, thanks to the pomegranate (anar). Twenty years ago, people in Atpadi taluka in Maharashtra's drought-prone Sangli district, could earn their livelihoods only by migrating to cities. Then they learnt to grow pomegranate, an arid area crop that needs little or no water. Today, a significant number are millionaires. Similarly, Aran village in Solapur district has no irrigation and meagre rainfall. Ten years ago, the villagers — most of them labourers — used to protest if the government discontinued a job guarantee scheme. With 1,000 acres under pomegranate, the village is now short of labour.

Similar stories abound in Sangole in Solapur district, Satana and Malegaon in Nashik district and Atpadi, Jat, Kavathemahankal in Sangli district, which produce India's best quality pomegranate. The plant grows in over one lakh hectares in the state, or 85 percent of India's total.

APEDA data shows exports have risen from 7 tonnes in 1999 to more than 35,000 tonnes in 2007-08 as European consumers have developed a taste for the premium Bhagva variety. The minimum income per acre even without any special care is Rs 2 lakh, that beats profits from sugarcane and grapes. With proper farm management, it can touch Rs



15 lakh per acre.

"People are ready to pay Rs 200 per kg for it," said Prabhakar Chandane, president of the All India Pomegranate Growers Association. Prices overseas are often twice higher, especially for Bhagva. Supply from Iran and Spain to Europe has been declining. Israel is trying to increase its area but has geographical restrictions. Farmers say the biggest threat is from diseases such as bacterial blight and wilt disease.

Farmers' outstanding Bank Loans at Rs 5,90,728 cr at FY'09 end

The total outstanding debt of farmers to banks in the country stood at Rs 5,90,728 crore on March 31, 2009, the Rajya Sabha was informed on 7 May.

"As per the information made available by National Bank for Agriculture and Rural Development (NABARD) and Reserve Bank of India (RBI), the total outstanding agricultural loan as on March 31, 2009, is Rs 5,90,728 crore," Minister of State for Agriculture KV Thomas said in a reply to the Upper House. The outstanding agricultural bank loan of Punjab and Haryana farmers stood at Rs 27,100 crore and Rs 22,416 crore

respectively, the reply said.

"As per provisional figures, 4,21,278 farmers in Punjab and 8,85,102 in Haryana are estimated to have been benefited under the agricultural debt waiver and debt relief scheme, 2008," the minister said.

About three crore small and marginal farmers and about one crore other farmers around the country benefited from the debt waiver and relief schemes announced in the 2008-09 Budget, the minister informed.

India to have its own standard for Good Agricultural Practices (GAP)

India will have its own standard for Good Agricultural Practices (GAP) on the lines of EurepGAP to help Indian farmers to upgrade their infrastructure and agricultural practices.

This was stated by K. Anbarasu, Deputy Director General-South, Bureau of Indian Standards (BIS) in Chennai recently. Called the IndiaGAP, the draft was put on BIS website to get public opinion and the standard will be released in a year. IndiaGAP would cover good practices to be followed in producing any agricultural produces by farmers.

Currently most of the States are following Good Manufacturing Practices, Good Hygienic Practices and Hazards Analysis and Critical Control Points (HACCP). IndiaGAP will be in addition to it and it has been developed keeping in mind the needs of big and small farmers, he said.

To sensitise the need to procure standardised products meant for different schemes, to prevent the use of adulterated food products, enhance the capacity of officers and to stress the need for upgrading the laboratories, the BIS Southern Regional Office organised the training programme for government officials of different departments.

"The main objective of the Prevention of Food Adulteration Act is to protect the public from poisonous and harmful foods; prevent the sale of substandard foods; and protect the interests of the consumers by eliminating fraudulent practices. The Centre has been taking several steps in controlling food adulteration.

The enactment of Food Safety and Standards Act will play a vital role in India and BIS has been continuously supporting the development of consumer awareness through standards," he said.

Call to Invest in Agri Research

The impending process of climate change could lead to food insecurity in less developed and vulnerable countries. This was stated by an official of the UN food and agriculture wing in New Delhi and called up countries to invest well in research to stave off a possible disaster.

Alexander Sarris, Director, Trade and Markets Division of the Food and Agricultural Organisation (FAO) said "uncertainty" among sceptics about the magnitude and timing of the phenomenon of climate change should not become an excuse for not investing enough in research and clean technologies.

Sarris was speaking at an international conference on "Tea and its future" as part of the centenary celebrations of Tocklai Experimental Station, where research on all aspects of tea cultivation and processing is carried out. The conference discussed tea plantations and the potential impact of climate change on them in India and other parts of the world.

He said in the long run, the Least Developed Countries (LDCs) and some of the non-BRIC developing countries were very likely to become growing net importers of food.

"The potential impact of climate change is expected most in South Asian and Sub Sahara nations, though there would be large regional variations in the impact," he said.

"Since it is one of the key sufferers of climate change, agriculture can become an important part of the Copenhagen process and the clean development mechanisms".

He said climate change affects food growing practices and would imply greater food insecurities, "largely in vulnerable countries", resulting in large-scale population movement.

"Already in Europe we are facing immigration pressures

and climate change will increase those pressures," he warned.

"Unless considerable research is dedicated to increasing the resilience of agriculture and growing practices, food insecurity is likely to have a major impact," he added.

Referring to climate sceptics, who have labelled the threat of climate change as exaggerated, Sarris said: "uncertainty is not an excuse for not investing in research for obtaining greater resilience".

"If a big disaster looms in the future, then action should be taken in the present, notwithstanding the fact that the time or magnitude of the disaster is uncertain," he said.

"We should be much more eager to prevent, rather than wait for the calamity to come, because if get too late, the disaster will be upon us," he said.

Vibha Dhawan, executive Director of TERI said the research community needs to focus on developing safe pesticides; insecticides and even genetically engineered varieties of tea to enable them resist the impact of climate change in the long run.

Dhawan said it has been observed that rainfall has declined in most regions of north-east India and there has been an increase in temperatures.

"Therefore, for sustainable tea production in the future, adaptation is the viable option," she said. "Attempts should be made to create more humid conditions in the region by measures like creating more water bodies, and research needs to be focussed on helping tea plants resist the conditions arising from climate change," Vibha added.



Agricultural Finance Corporation Ltd.

The Editor
Financing Agriculture
Agricultural Finance Corporation Ltd.
Dhanraj Mahal, 1st floor
Chhatrapati 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: _____



Dhanuka Kheti Ki Nai Takneek

A Golden March towards Food Security & Sustainability



Dhanuka Agritech Limited

Dhanuka House, 861-62, Joshi Road Karol Bagh, New Delhi-110005 Phone : + 91 -11- 30511500,
Fax : + 91-11-23518981 E-mail : headoffice@dhanuka.com Web site : www.dhanuka.com

