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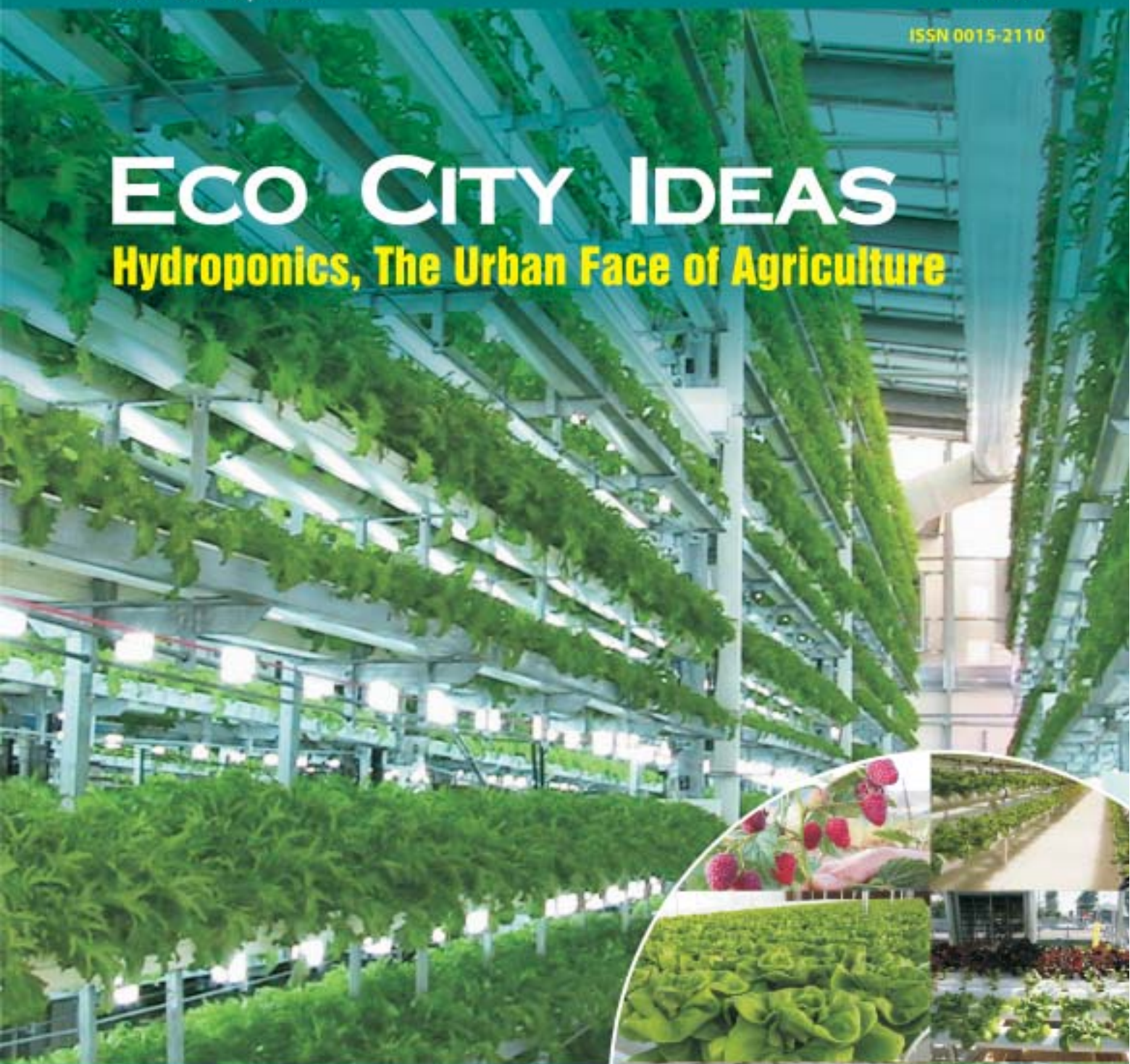

ECO CITY IDEAS

Hydroponics, The Urban Face of Agriculture

ORGANIC FARMING IN INDIA: RELEVANCE, PROBLEMS AND CONSTRAINTS

COMMERCIALISATION OF MICROFINANCE IN INDIA

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EDITORIAL

In this April edition of *Financing Agriculture* we take off from our previous issue in which we had carried an article on hydroponics. Hydroponic agriculture is regarded in Sci-fi literature as the only form of sustainable agriculture in space! Although it is still an evolving science, hydroponic agriculture (growing plants in water solution rather than soil) is spreading fast the world over. The nutritional requirement of the plants in this system of soil-less farming is met by the nutrient mixtures, called hydroponics fertiliser mixtures, added to the water in which the plant roots are kept submerged. These mixtures are made of chemical plant nutrients.

Read about the challenges of this form of agriculture and its relevance in today's society in our issue focus.

According to the Food and Agriculture Organization (FAO), sustainable agriculture .is the successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of environment and conserving natural resources. The cover story on sustainable organic farming talks about the problems and constraints of this form of agriculture.

India has a large and diverse agriculture and is one of the world's leading producers. It is also a major consumer, with an expanding population to feed. For this reason and because of its agricultural and trade policy of first ensuring food and nutrition security of its population, its presence on the world market has been modest in relation to the size of its agriculture. Our authors investigate India's role in the world agricultural scene in a special report.

Most of the early microfinance in India happened through donor and philanthropic funds. These funds came in to not-for-profit organizations. However as the activities scaled up, it was imperative to move to a commercial format. Our article on commercialisation of microfinance in India examines the growth imperatives and the transformation processes. As also the implications of the transformation process and its effect on the personal enrichment of the promoters of MFI as well as the governance implications.

Also featured in our spotlight section is an article on the Indian agricultural policy environment which is still lagging behind the structural change occurring in India's consumption and production baskets.

Do keep writing to us at fa.afcl@gmail.com

Happy Reading!

A.K. Garg
Editor-in-Chief

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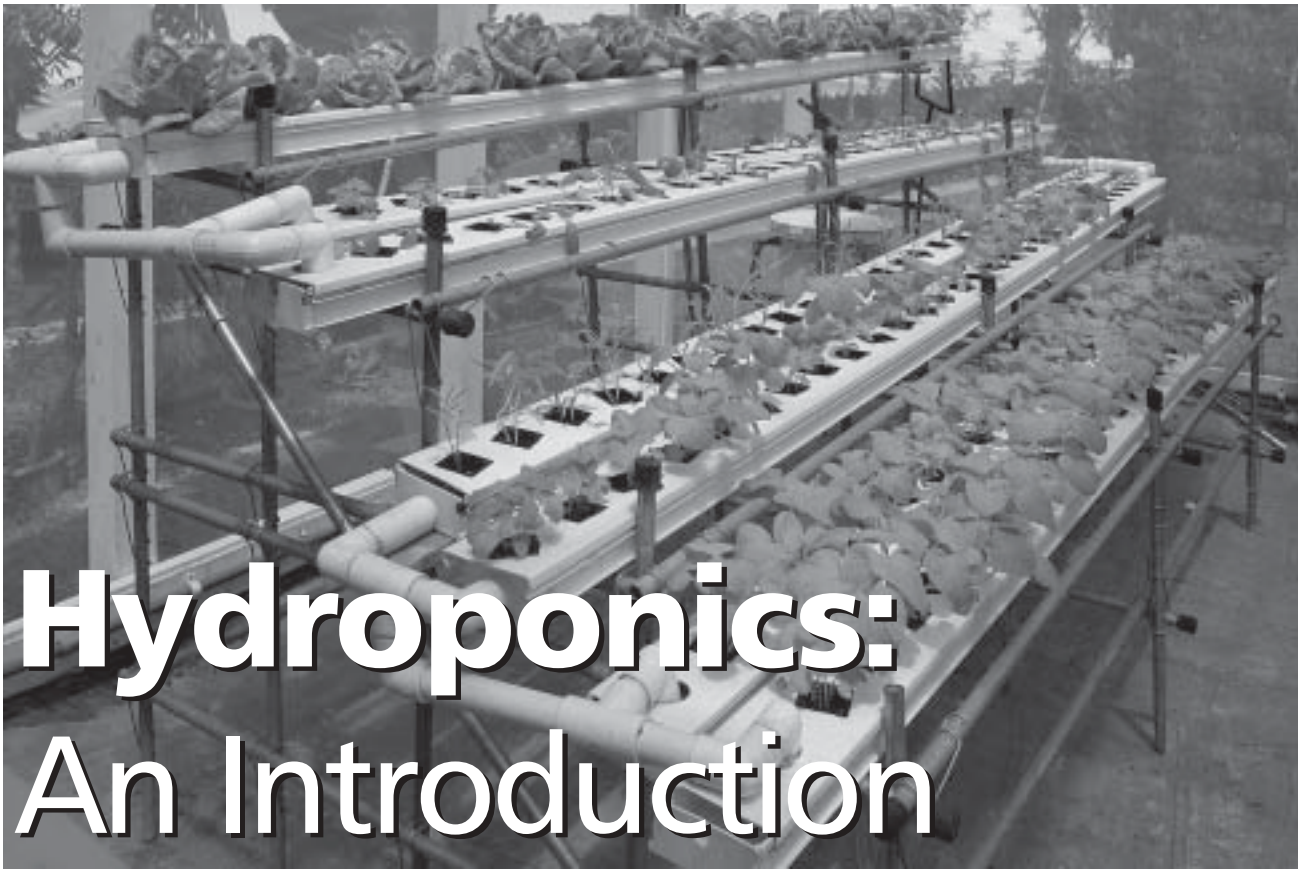


Hydroponics: An Introduction

By **Mohasen Doha and Colleagues***

Hydroponics is a method of growing plants without soil. In nature, the soil provides nutrients and is a means of physical support for the plant. In hydroponics, soil is replaced by inert media such as perlite, vermiculite, horticultural rockwool, sand, or fired clay pebbles to which the necessary elements for growth are added in the form of a nutrient solution. By incorporating a study of hydroponics into the school curricula, students at all levels will be able to appreciate the different ways in which plant life can be sustained. For many centuries, people have endeavored to increase yields and improve crop quality against nature.s inconsistency. The basic techniques of hydroponics have been known for some time, but it is only since the beginning of this century that the techniques have been refined to the point where they could be applied commercially. Dr. Gericke of the University of California at Los Angeles successfully grew tomatoes in water culture before 1936, arousing great interest in hydroponics as an alternative method of horticulture. The commercial and hobby production of vegetables and cut flowers hydroponically is becoming more popular. If optimum growing conditions and nutritional requirements are applied, combined with sound horticultural management, hydroponics can offer an alternative means of food production. Good quality, high yielding crops may be produced in areas where climate or location may previously have hampered the production of crops by soil cultivation. Many students and teachers like using hydroponics as a learning tool because it is a .hands on. method. It brings the disciplines of chemistry, biology, and physics together.

Objectives

- To be able to set up one or more of the various hydroponic systems.
- To be able to maintain the hydroponic system(s).
- To be aware of the advantages and disadvantages of the various hydroponic systems.
- To be aware of the different media used in hydroponics.
- To understand nutrient elements and solution pH.

Hydroponic Fundamentals

The word hydroponics. was coined in the USA, in the early 1930s, when Professor Gericke at U.C.L.A. coined the name to describe the growing of plants with their roots suspended in water containing mineral nutrients. The name comes from two Greek words: hydro (water) and ponos (to work, labor), and literally means water works. The definition of hydroponics has gradually been broadened. Today it is used to describe all ways of growing plants without soil. It is synonymous with the term soilless culture and both terms are restricted to the growing of plants without soil. All systems except hydroculture can be used for the commercial production of vegetables and cut flowers. Commercial

hydroponics is a relatively recent development. However, the art of hydroponics is believed to date back to the Aztec Indians of ancient America, who grew their plants on rafts on shallow lakes where cultivation in soil was not possible. These rafts were covered with soil removed from the lake bed, and the plant roots grew through the soil down into the water of the lake. A few of these floating gardens. still exist near Mexico City. Professor D. Hoagland of U.C. Berkeley verified many of the Gericke experiments during the 1930s. Commercial hydroponics was really first started in 1936, when gravel culture was used. Robert and Alice Withrow at Purdue University developed the Nutriculture*. system of gravel culture in 1940, which was used by the U.S. Army well into the 1950s to supply troops in Japan and Korea.

Activities

There are many ways in which hydroponic systems may be established. The manner chosen largely depends upon the availability of space, the preferred media, financial concerns and the type of crops desired. The hydroponic systems which follow may be classified under eight headings:

- Surface Watering Technique
- Subirrigation
- Wick System
- Grow Bag Technique
- Soak and Drain
- Rockwool Technique
- Drip Feed Technique
- Nutrient Film Technique

Each system may be modified or expanded to suit individual requirements while, similarly, the medium used may be varied from that suggested here. There is abundant scope for imagination and initiative in the design of an installation which would suit your particular needs.

Advantages

A number of advantages can be identified when growing crops hydroponically, compared with growing plants in soil.

- The labor input is less than if soil is used, once the unit is established.
- The work involved is generally light. Heavy manual operations associated with normal cultivation practice, such as digging weeding, and ploughing, are eliminated.
- No crop rotation is necessary as the growing medium can be reused continually, or replaced.

- Because plants do not have to compete for moisture and nutrients, production in hydroponics compared with soil cultivation in a comparable area may be increased approximately two times.
- Plants are usually uniform in growth and maturity.
- There is minimum wastage of water.
- There are virtually no weeds and no gophers!
- As the nutrient requirement of plants varies according to the seasons, hydroponic gardening can provide plants with optimum quantities of the necessary nutrients during the different seasons. This will enable maximum growth to be achieved.
- The need for dangerous pesticides is largely eliminated if the plants are grown in a controlled environment. Root diseases are controlled to a greater extent.
- Disabled people are not excluded from participating in hydroponics, as benches or units may be adapted to their requirements.

Hydroponic Culture Types

At the 4th International Congress of Soilless Culture in 1976, the various systems of hydroponics were classified and defined as follows.

Water Culture: Roots of plants submerged in the nutrient solution with little or no growing media. The Nutrient Film Technique (NFT) is an example.

Sand Culture: Roots of plants growing in a solid aggregate of particles with a diameter less than 3 mm. Fine perlite, plastic beads, and washed river sand have all been used. Beach sand is too fine, giving inadequate aeration of the roots.

Gravel Culture: Roots of plants growing in a solid aggregate composed of particles with a diameter more than 3 mm. Gravel, basalt, scoria, pumice, plastic, and other inorganic material. Used in the 1970s in subirrigation systems in the USA. The size of most gravel used is between 5 to 10 mm in diameter, with rounded edges preferred.

Vermiculaponics: Roots of plants growing in vermiculite, or a mixture of

Using grow bags is a simple and cheap way to grow plants hydroponically. Fill a large clean opaque polyethylene bag with the growing medium of your choice and seal the open end with freezer bag ties or insulation tape

vermiculite with any other organic material. This works very well for small experimental systems.

Horticultural Rockwool Culture: Roots of plants growing in horticultural rockwool or any similar material. This method really came into it.s own during the 1980s, after research in the 1970s.

Hydroculture: All systems or methods of hydroponics, if used especially for growing ornamentals in the home or office. It usually means using fired clay pebbles in a passive system with no pump. Excellent for slow growing house plants like ferns or orchids.

Aeroponics: This system uses a spray of nutrient solution that is aimed at the plants roots, which are supported in a chamber filled with moist air. Very high growth rates have been observed.

Wick System

In the wick system, the roots are moistened by the nutrient solution passing up a wick made of nylon, rayon or polyester, or by using a lamp wick. Stand a pot, supported above the nutrient solution, in a tray. Soak the wick thoroughly before passing it through the drainage hole into the nutrient solution, leaving 10 cm of wick in the pot. Unravel the upper end of the wick to give better distribution of the nutrient solution throughout the medium. The growing medium must also be thoroughly soaked to enable the wick to draw up the nutrient solution. Vermiculite, perlite, or fired clay pebbles are the most commonly used growing media for wick systems. Rockwool could also be used, but it may hold too much water for many plants.

Hydroculture is a special type of wick system that uses the high capillary action of fired clay pebbles. No actual wick is required. The inner pot looks like a coarse net type of structure. It holds the clay pebbles and the plant itself. This culture pot or net pot fits inside another container which is water tight. Either a float type water level indicator, or a see through window in the outer pot lets the gardener visually check the water level.

Grow Bag Technique

Using grow bags is a simple and cheap way to grow plants hydroponically. Fill a large clean opaque polyethylene bag with the growing medium of your choice and seal the open end with freezer bag ties or insulation tape. Lie the grow bag on a firm surface. To ensure good hygiene, place polyethylene sheeting underneath the bag. Cut 3 or 4 drainage slits around the outside edges of the bag, approximately 10 mm from the base to allow drainage of excess nutrient solution. Cut holes in the top of the grow bag to allow plants to be inserted. Four to six plants per bag is usually sufficient, but the number will vary according to the type of plant grown or the size of the bag. Thoroughly soak the medium in the grow bag with dilute nutrient solution, before inserting the plants. Plants should receive nutrient when required. Use a plastic watering can or drippers to apply the nutrient solution. The drippers could be automated by using a timer and a pump.

Subirrigation

This system is based on the capillary action of the growing medium which carries the nutrient solution up to the root growing zone. In this particular method a pot is permanently left to sit in nutrient solution. When river sand is used as the growing medium, the nutrient will rise approximately 15 cm above the level of the solution. This level will differ according to the particle size of the river sand used. Of the 15 cm of growing medium available, only 10 cm is suitable for root growth. The first 5 cm above the level of the nutrient solution is saturated and therefore unsuitable for root development.

Regular flooding of the nutrient solution in the tray to the 5 cm mark will alleviate drying out of the media. Rockwool will draw up even more water than sand, due to it.s very high capillary action. Rockwool must have a drainage area below it, so that water has somewhere to drain. Otherwise standing water may become anaerobic at the root area. Fired clay pebbles are an excellent media for cooler climates.

Flood and Drain (Ebb & Flow)

A waterproof growing container is placed on a bench and sloped to an outlet to which a hose is connected. The other end of the hose is connected to a bucket or drum which contains the nutrient

solution. When the container is held above the level of the growing container, the nutrient solution will flow out and soak the growing medium. When the bucket or drum is lowered, the excess nutrient solution will drain out of the medium back into the bucket. The size of the container should be limited to approximately 18 liters, as any larger will make lifting difficult for students.

The container is then topped off with water for the next irrigation. Completely renew the solution every 1-2 weeks. The medium must not be left totally flooded during hot weather because this will cause rapid root death. It is advisable to retain a small reservoir of solution in the bottom of the container to carry plants over a weekend or during periods of hot weather A pump and timer could be used to automate this system. The normal recommendation is to water every 2 hours during daylight. The tray should fully drain within 30 minutes after the pump shuts off.

Rockwool Technique

Horticultural rockwool can be used as a soilless growing medium. The rockwool referred to is a horticultural grade of rockwool capable of absorbing water and made to a specific density. Beware of using standard thermal rockwool products as these are water repellent, and may have toxic fire retardants. The rockwool hydroponic system depends upon using:

- Rockwool propagation blocks, or small cubes
- Rockwool 75 mm wrapped cubes (or 100 mm)
- 900 mm x 300 mm x 75 mm rockwool growing slabs

The advantage of using rockwool as a growing medium lies in the fact that the plants at no point need to be removed from the rockwool. Plants are propagated in rockwool propagation blocks, which are then transplanted into rockwool 75 mm wrapped cubes, which are then directly placed onto the rockwool growing slab when plants are at an advanced stage. Most plants may be grown to maturity in the wrapped cubes. The large slabs are only needed for crops with a very long life like tomatoes or cucumbers. Both of those crops could keep bearing for six to nine months.

Propagation

Rockwool propagation blocks are used with the uncut surface uppermost. Cuts in the block help prevent roots from growing from one block to another and also make the blocks easier to separate at the end of the propagation period. Blocks are placed in seed trays or placed directly onto propagation benches lined with polyethylene sheeting. Looking at the underside of the propagation block the air gaps are readily observed.

How are seeds sown in Rockwool?

A hole is made in the propagating block into which a seed is sown. DO NOT push the rockwool fibers together to cover the seed. The blocks must be completely wet before the seeds are sown. This can be achieved by submersing the blocks in nutrient solution. Once the seeds have germinated, water them with nutrient solution. Plants that can be direct-seeded into cubes are cucumber, zucchini, legumes, tomato and lettuce. Keep the rockwool moist, but not soggy. The vertically-arranged fibers in rockwool allow most softwood and semi-hardwood cuttings to be inserted directly into wet propagation blocks. Bottom heating, if available, should be used. Plants suitable for cuttings are carnations, chrysanthemums, begonias, indoor plants, roses and fuchsias. Mist propagation can be used, but waterlogging and plant diseases can develop from frequent misting. To improve drainage, stand blocks in seed trays or on a coarse aggregate. Increased humidity can be achieved by using a small polyethylene tent which will aid the establishment of plants.

Growing On

Tear away the rockwool propagation blocks with the struck cuttings or seedlings. Separation of blocks is easier when wet. Individual blocks can be removed easily. Air gaps reduce rooting into adjacent blocks. When roots are visible on the outside of the propagation block they are ready to transplant into the larger blocks. The propagation blocks are then directly placed into rockwool (75 mm or 100 mm) cubes. The propagation blocks fit neatly into the holes in the larger cubes.

Safety Note: If the grower suffers from skin allergies it is advisable to cover the arms and wear leather gloves while working with dry horticultural rockwool. Once the rockwool has been moistened it has no irritating effects on skin.

Rockwool Slabs for crops
that grow over 6 months

Soak the rockwool-wrapped cubes (75

mm or 100 mm) with nutrient solution before inserting the propagation blocks. Again, place the cubes on a well-drained surface. The cubes must be watered daily with nutrient solution. When the plants in the rockwool cubes are at an advanced stage, the cubes containing plants can be placed directly onto the rockwool growing slabs. The roots should grow into the slab from the rockwool-wrapped cube in 3-7 days. It is necessary to prepare the rockwool growing slabs prior to placing the cubes on the slabs. Arrange the 750 mm x 300 mm x 100 mm rockwool growing slabs in beds approximately 300 mm apart. A drainage channel will be required to remove any excess solution, so the slabs must be tilted slightly toward the drainage channel. Lay sheets of black polyethylene on the ground, along which the growing slabs are laid in rows. Then cut 3-4 tiny slits on each side of the growing slabs, approximately 10 mm from the base to allow for the drainage of excess solution. Thoroughly soak the growing slabs with nutrient solution before the wrapped cubes are placed on the slabs. Drippers are used to provide each plant with nutrient solution. It is necessary to have appropriate timing mechanisms in order to irrigate for the required time. Seasonal variation and the different needs of plants will influence how often the system is irrigated. Irrigation must be sufficient to prevent the rockwool from dehydrating and to prevent the development of dry spots and areas of salt accumulation. Set the dripper in the top of the 75 mm cubes. Pump the nutrient solution from a large tank using a submersible pump. Extra solution should be pumped at each watering, to ensure at least a 10 percent drainage of fluid through the slab. The extra amount ensures that nutrient buildup doesn.t happen too quickly.

Growing media

Many types of media and combinations of media may be used to grow plants hydroponically. Choice is largely dependent upon availability, the type of system in use and the plants to be grown.

Crushed granite: In hydroponics, screened crushed granite of approximate particle size of 2 mm should be used. The medium is totally inert, but has a relatively low water retention capacity.

Scoria is a relatively porous volcanic rock which is very good as a medium. Generally a mixture of fine and coarse scoria is used, being heavy enough to support plants yet having good aeration. It is sold as lava rock in many hardware stores

The medium can be reused over a period of time.

Sand: Coarse washed river sand is a mixture of fine and coarse particles. Sand in the 0.5 mm to 2.5 mm range is most suitable, allowing drainage and good aeration. Between 20-25 percent by volume of peat moss may be added to improve moisture retention. Builders sand may be used as long as it does not contain large quantities of fine broken shell which will increase the alkalinity of the medium.

Scoria: Scoria is a relatively porous volcanic rock which is very good as a medium. Generally a mixture of fine and coarse scoria is used, being heavy enough to support plants yet having good aeration. It is sold as lava rock in many hardware stores.

Perlite: Perlite is a volcanic rock, which when heated in excess of 1000 C, expands into lightweight particles. In hydroponics approximately 3 mm particle size should be used. The medium is inert and sterile and is used as a lightweight support medium. It does not have a high capacity for water retention and has no nutrient holding capacity. Perlite can be used on its own or with vermiculite, depending upon specific plant needs. The medium must be pre-wetted before use. Avoid inhalation of the dust.

Vermiculite: An expanded mica, vermiculite is light and has a very high capacity for water retention. Because of its flaky structure, vermiculite eventually breaks down and requires replacement every 2-4 years. Works well in warm climates.

Mixes: A 50/50 mix of perlite/ vermiculite makes an ideal growing medium. It is advisable not to mix sand, scoria or crushed granite with Perlite or vermiculite, as they will separate when wet due to differences in densities.

Rockwool: Horticultural rockwool consists of a mat of long, fine fibers, spun from molten natural rock. It is inorganic and inert, very light when dry, sterile, is not biodegradable and has a very high water and air holding capacity. It is sold in Australia under the trade name of Growool. In Canada, the United States and Europe the product is marketed under the brand name of Grodan Rockwool.

Fired Clay Pebbles: This is a high performance growing media. The clay pebbles are either formed from clay and fired, or milled form shale rock, and then fired. In either case the end result is a porous interior surrounded by a less porous hard shell. The less porous hard shell prevents the media from degrading in the presence of water. The capillary action is very high. Three sizes are available.

Coconut Fiber Coir: Not used much in the United States, but due to the low cost it is used in tropical countries. Not recommended for recirculating systems due to leaching of organics into the water.

Shredded Fir Bark (or coarse fir sawdust): Again, low in cost but not recommended for recirculating systems due to the leaching of large amounts of tannic acid into the water. Canadian tomato growers used to use non-recirculating drip systems with coarse sawdust with good results. The sawdust must be replaced each season. Orchid growers use fir bark, as it simulates the natural way they grow on trees, and doesn't hold excess water.

Care and maintenance of hydroponic systems

Recirculating Systems: As the level in the supply tank falls in hydroponic systems which recirculate the nutrient solution, it should be topped off to its original level with water. This can be achieved manually, or automatically by the use of a float valve placed in the nutrient tank. Do not top off the tank with nutrient solution, otherwise you will have no idea of its strength. After a while, the nutrient solution will need replacing. As a rough guide this should be done about every 1-2 weeks in summer, every two weeks in spring and autumn, and in winter every four weeks. As a more accurate method of determining when to replace the nutrient solution, a conductivity meter can be used. This instrument measures the electrical conductivity of freshly prepared nutrient solution, so when the conductivity falls to two-thirds of the original reading, the solution needs to be replaced or topped off with nutrients.

Non-Recirculating Systems: In systems where the nutrient solution is not recovered and reused, the supply tank is simply topped off with nutrient solution at any convenient time. Make sure that the supply tank is big enough to hold sufficient nutrient solution to last a number of days. Try to keep wastage to a minimum by learning how much is required under various conditions and efficiently applying the correct amount.

In greenhouses, good air movement is essential and will assist growth and reduce the incidence of fungal diseases on the foliage. Complete protection from low temperatures can only be achieved with a heated and regulated greenhouse

Moisture Content: The nutrient solution should be applied at a rate to fully wet the growing medium and cause some drainage. Do not keep the growing medium flooded with solution as this will force the exclusion of air and have detrimental effects.

Flushing: Over a long period of time, deposition of nutrient salts in the growing medium occurs, which may cause an imbalance in the nutrient supply. Every 1-4 weeks flush the whole system out with plain water.

High Temperature: If the temperature becomes too hot in summer then some protection will be needed. The plants may need some shelter such as shade cloth if grown outdoors. If grown inside a greenhouse, shade cloth or the application of whitewash may be needed. In greenhouses, good air movement is essential and will assist growth and reduce the incidence of fungal diseases on the foliage. Complete protection from low temperatures can only be achieved with a heated and regulated greenhouse. Very little protection can be given to plants grown in the open. Covering plants with a plastic sheet can protect against light frosts, and advance their growth slightly.

Containers: When building any hydroponic systems, use inert materials like plastic or fiberglass. Some materials corrode and cause a nutrient imbalance. For example, if galvanized iron is used, zinc toxicity in plants will occur.

**The authors are teachers at the Hydropincs School, Mussorie*

Eco City Ideas:

Hydroponics, The Urban Face of Agriculture

By **Vikram Adige***

Hunger and water scarcity are but two sides of the same coin, both in urban India as well as in farming communities depleting their reserves of arable land. We desperately need for traditional practices of soil-based agriculture to be complemented by more productive and ecologically-sustainable forms of modern agriculture. These modern practices need to be cognizant of our modern day challenges of de-forestation, overly complex distribution of perishables, overuse of water for irrigation, excessive use of transportation fuels, and the rising menace of food price inflation.

Hydroponics, a technology for soil-less farming of fresh vegetables, herbs, fruits and flowers in a specially formulated nutrient-mix substrate, is now ripe for use in back-yard, roof-top, greenhouse, and commercial farming. The practice has been around for a number of decades, but recent innovations have allowed this technology to grab the discerning eye of green-tech entrepreneurs and venture capitalists. The value proposition is abundantly clear, especially in land and soil deprived urban areas. It is a mode of agriculture that does not need soil and hence can be practiced just about anywhere with the right tools, that needs 90 percent less water than soil irrigation, that can grow in-demand non-native produce, that can grow them faster with significantly higher yields and therefore revenues, that can be productive on a year-round basis, that is less prone to soil borne diseases and micronutrient deficiencies, that needs less growing area per unit of organic output, and finally, that if practiced well enhances the flavor and nutritional content of food. Much like in the renewable arena, hydroponics is a form of agriculture that enables distributed production, where farmer/producer and consumer are

brought closer to one another while eliminating wastage.

So the key feasibility questions remain: What early successes have proven the solution? How costly and available are the hydroponics options? Which hydroponics business models may be attractive in places like India?

Successes

There are diverse examples of hydroponics projects across the globe, with varying levels of innovation, scale and success. Relevant to hydroponics to urban locales, Changi General Hospital in Singapore uses rooftop farming to now meet most of its fresh food needs. Gotham Greens prides itself as New York's first commercial rooftop 'closed loop' hydroponics operation, in which plants are being grown directly in nutrient-enriched water that is carefully cleaned and recycled back into the system, and solar-powered pumps are feeding nutrient-enriched rainwater to an acre of greenhouse space. ProMedica Health System network of clinics has used the roof of a hospital in Toledo, OH, to grow using hydroponics more than 200 pounds of vegetables and then serve them to patients and a nearby food shelter. This project led to the setup of eight more vertical gardens throughout underserved areas of Toledo. The Woman of Hope Project in Hyderabad, at the Center for Promotion of Simplified Hydroponics, shows different ways of setting up hydroponics for generating livelihoods for women. Atul Kalaskar uses hydroponics to grow strawberries, and believes that as small and marginal farmers become more competitive by moving up the chain of activities such as drip-irrigation, poly-houses and cooperatives, they will eventually aspire to going soil-less in hydroponics. The Pet Bharo (meaning "fill your stomach") project in India, affiliated with the Institute of Simplified Hydroponics, provides training, consulting services, agricultural inputs and testing services for setting up simplified hydroponics as well as commercial hydroponics.

Some of the more capital and technology intensive projects are AeroFarms, which is building hydroponics farms in containers stacked on top of each other in warehouses and old buildings, lit by LED lamps that also provide pest control when set to emit certain wavelengths. Cityscape Farms in San Francisco is developing rooftop organic greenhouses that use hydroponics along with aquaculture, in which the nutrient mix for the hydroponics is organically fertilized with fish waste produced from tilapia fish raised on-site. The water is then cleaned and recycled back into the fish tanks to complete the loop. One of the most technology-intensive hydroponics projects, and one that was voted one of Time Magazine's Top 50 Best Innovations of 2009, is Valcent's 'Vertical Farming Technology.' His VertiCrop innovation grows non-GM plants in rotating rows one on top of another, feeding them precise amounts of light and nutrients while using the vertical stacking to use far less water than conventional farming. And, by growing upward instead of outward, he can expand food production without using more land. He claims to be able to increase production volume for field crops up to 20 times over, while using as little as 5 percent of the normal water supply. One final examples of very large scale operation is Eurofresh's 274-acre hydroponic greenhouse in southeastern Arizona, where more than 200 million pounds of tomatoes were produced in 2007.

Gotham Greens prides itself as New York's first commercial rooftop 'closed loop' hydroponics operation, in which plants are being grown directly in nutrient-enriched water that is carefully cleaned and recycled back into the system, and solar-powered pumps are feeding nutrient-enriched rainwater to an acre of greenhouse space

Cost

With regard to cost, here are some initial resources for gathering information. Vincent Dessberg, a rooftop hydroponic farmer in Sarasota, FL, growing fruits & vegetables, says he spent $25,000 to set

up his facility, including the cost of his 6,000 plants growing vertically in 180 hydroponic planters. One could visualize his capex and opex needing to be much higher for a commercial setup that needed to pump water through sophisticated sensors that automatically adjust nutrient and acidity levels in the water. Dinesh Rao, a relatively new hydroponics practitioner in India who carefully manages his water and nutrient mix, says a capex of ~Rupees 100,000-150,000 ($2,200-3,300) was required to set up a 1000-plant capacity, giving 10 tons of annual tomato output. The cost of a high-end hydroponics greenhouse, using state of the art technologies for lighting, water, nutrients and so on would probably need to be offset by sales into premium organic retail channels such as a Whole Foods, and export markets. Lower-end simplified hydroponics farms, which is the focus of my study here, is usually based on a static solution culture (compared to a continuous flow solution culture, or an aeroponics culture) or a solid-medium culture, and a powder (rather than liquid) nutrient mixture, and would also get the job done though at lower yield. Low-cost greenhouses and polyhouses would be key to designing a sustainable hydroponics model for growing affordably priced foods. Another convenient benefit of running such as project in tropical India, where greenhouse heating and humidity is not as much of an issue, is that less energy is required for the operation. In general, key cost drivers would be availability of affordable nutrient mix, access to training and quality analysis, and technology-level that is matched to the buyers' requirements.

Models

Low-cost hydroponics greenhouses (along with grading and packing area), built around distributed production with close proximity to consumers, can be a stabilizing factor in food production and retail. The model would need to capitalize on the predictability of producing year-round nutrient-rich vegetables, extract cost savings from increased yields, and adequately market the health benefits of pesticide-free produce. But this would make sense only if an affordable and stable price point is achieved for the produce. In urban India, one business model possibility would be to build a showcase hydroponics greenhouse on the rented terrace of a chain of hospitals, much like in some of the examples provided above, prove the model for a select range of fruit-bearing and leafy crops required by the hospital and the nearby community, and then franchise out the model across the rest of their network. The initial phase of this project would need to involve R&D into technology and the nutrient mix requirements for different families of crop. Over time, the business could then be expanded to co-locate (I'm using this term loosely) greenhouses with farmer's markets and restaurants that need fresh produce, animal farms that require fodder crops, and specialty retailers that need flower/ornamental crops and condiments. Another more scale-oriented model would be to develop a high-tech vertical farm, expressly to supply large-format quality-sensitive food retailers such as Reliance Fresh. All of these models could provide employment to low-skilled labor, and stay true to their mission of local consumption by not entering into the logistics heavy export market.

On the related topic of quality, there is something to consider on the 'organic' versus 'inorganic' hydroponics front. With food inflation continuing to rise, one can imagine shoppers who spend more needing more alternatives to expensive, imported and organic vegetables. They may gladly gravitate towards the next best thing – fresh vegetables grown hydroponically, and locally by farmers right in their community. Note: hydroponic farms can use both organic and inorganic (i.e. artificially-made, the more popular) nutrient mixtures, and it is unclear as to whether the former option provides adequate yields and other benefits. I am therefore reluctant to suggest that going the more expensive organic-fertilizer route is worth it for affordable hydroponics.

Conclusion

In closing, did you know that more than half of the world's plants already grow hydroponically? I'm referring to the oceans, where there is no soil and plants draw their nutrients directly from the sea water around them. It is worth appreciating that hydroponics is simply taking a cue from nature and applying it to our life on land. It is now up to our innovators and financiers to make this commercially viable on a grand scale.

**The author is novelist and has written various books on the agriculture systems of India*

A Breakthrough in Hydroponics

By **Surinder Sud***

Although it is still an evolving science, hydroponic agriculture (growing plants in water solution rather than soil) is spreading fast the world over. The nutritional requirement of the plants in this system of soilless farming is met by the nutrient mixtures, called hydroponics fertiliser mixtures, added to the water in which the plant roots are kept submerged. These mixtures are made of chemical plant nutrients.

A breakthrough has now been achieved by an Indian hydroponics hobbyist in creating a purely organic nutrient mixture for growing plants in water. This wholly chemical-free plant growth solution has been tested successfully for growing several plants, including common vegetables like tomato and arbi and some high value medicinal plants like Brahmi, Arjun and Cineraria. Indeed, a good deal of research is underway in this system of soilless farming in the US and Europe but not much headway has been made anywhere in organic hydroponics.

Of course, some hydroponics enthusiasts abroad have been experimenting with various kinds of organic manures and mixtures of plants, but successful and commercially viable organic hydroponics models are still not available. In fact, even globally accepted principles for certifying organic hydroponics products are also not yet available. The success in this venture in India is claimed by a Delhi-based family headed by Vidya Shankar Singh. His daughter, Shweta Singh, a Delhi University botany student, has been assisting him in discovering and further improving the biofertiliser mixture for growing plants in ordinary water. "Though we normally call this biofertiliser an ayurvedic medicine for raising plants, we have also given it the name Shweta Anand Growth Solution", says Singh. It costs only about Rs 30 to Rs 40 for producing one litre of this concoction, though it takes a long time of six to eight months to process it. This mixture, added to the water at the rate of just one millilitre per litre per week, takes care of the complete nutritional requirement of

the plants. Singh has also evolved another wholly plants-based mixture for spraying on the plants to boost their growth. He has named it Shweta Protonic mixture. He, however, is keeping the formula for making these mixtures a secret. Nor does he want to disclose the plants whose leaves are used in preparing them. "I will work on it for a couple of years more before thinking of launching commercial production of this bio-fertiliser for hydroponics.

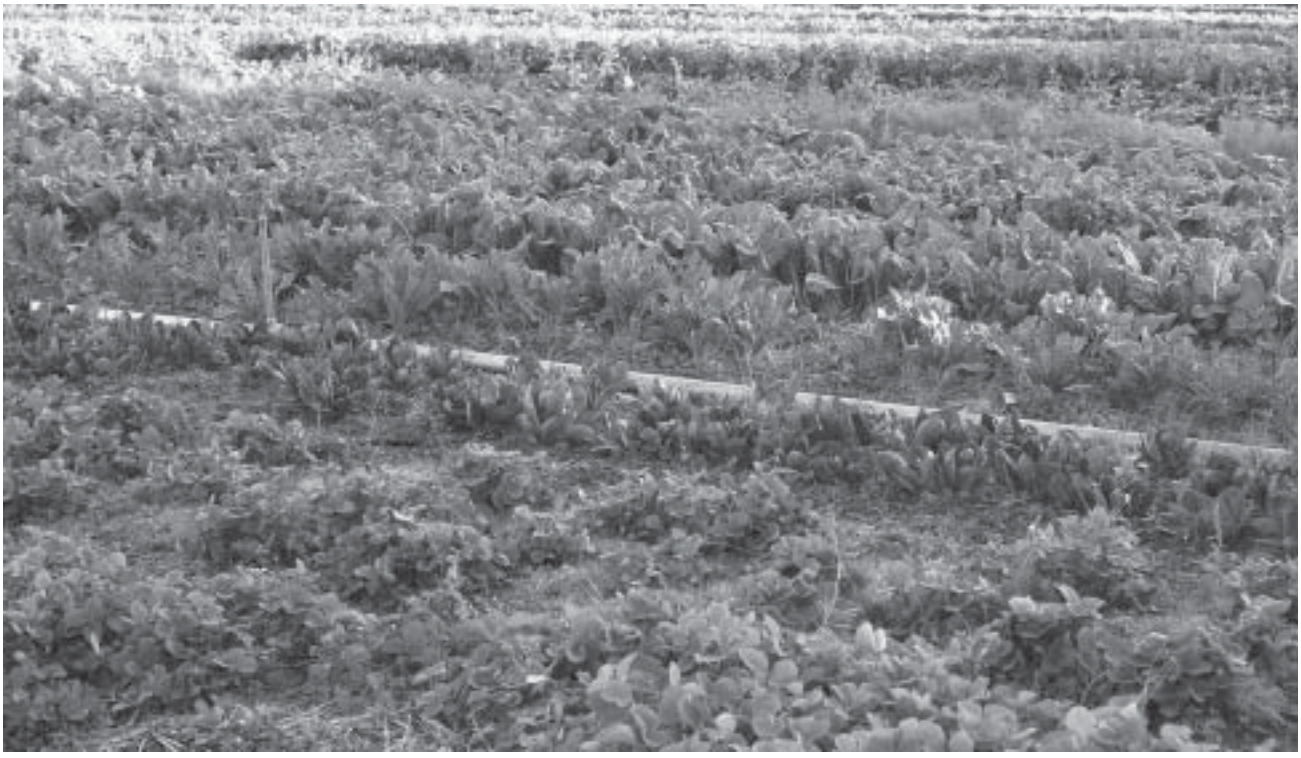
However, if some government organisation, such as the Indian Council of Agricultural Research (ICAR), comes forward, I am willing to cooperate with it in promoting organic hydroponics in India," he says. The hydroponics garden that Singh is maintaining on the roof of his house near backside entrance of the Nizamudin railway station has several species of flowering plants, vegetables and medicinal plants. He believes that nearly 200 commercially important plants can be grown by hydroponics technique. But, surely, this technique cannot be applied to all plants. His attempts to grow horticultural plants like lemon and grapes have not been successful. In India, the hydroponics system of farming was first attempted by an English scientist W J Shalto Duglas in a laboratory in Kligpong area of West Bengal in 1946. After his return to England in 1948, the scientific research work on it virtually stopped. Globally, however, the chemical fertiliser mixture-based hydroponics is in vogue in several countries, especially in areas where either the climatic conditions or the poor soil quality prohibit normal crop cultivation. In British Columbia, the bulk of the greenhouse industry is now using hydroponics technology.

Various models of the hydroponics are in use for indoor as well as outdoor gardening and farming. Specialised cultivation techniques have also been evolved for growing vegetables in submarines to feed the crew members. It may soon also find its use in spacecrafts. The US space agency is reported to have begun experimenting growing plants in space. In India, too, several tracts of wastelands having poor quality soil but plenty of water can be brought under hydroponics. All that will be needed is to create an impervious surface at the bottom and bunds to hold water. The technology used for polythene lining of canals can come in handy for creating large hydroponic farms to grow food crops, vegetables and other plants.

**The writer is a renowned journalist. The article is an excerpt that was published in Business Standard*

Organic Farming in India: Relevance, Problems and Constraints

By **Dr. S. Narayana***



Sustainable development has caught the imagination and action all over the world for more than a decade. Sustainable agriculture is necessary to attain the goal of sustainable development. According to the Food and Agriculture Organization (FAO), sustainable agriculture "is the successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of environment and conserving natural resources". All definitions of sustainable agriculture lay great emphasis on maintaining an agriculture growth rate, which can meet the demand for food of all living things without draining the basic resources.

Organic farming is one of the several approaches found to meet the objectives of sustainable agriculture. Many techniques used in organic farming like inter-cropping, mulching and integration of crops and livestock are not alien to various agriculture systems including the traditional agriculture practiced in old countries like India. However, organic farming is based on various laws and certification programmes, which prohibit the use of almost all synthetic inputs, and health of the soil is recognised as the central theme of the method.

Adverse effects of modern agricultural practices not only on the farm but also on the health of all living things and thus on the environment have been well documented all over the world. Application of technology, particularly in terms of the use of chemical fertilizers and pesticides all around us has persuaded people to think aloud. Their negative effects on the environment are manifested through soil erosion, water shortages, salination, soil contamination, genetic erosion, etc.

Organic farming is one of the widely used methods, which is thought of as the best alternative to avoid the ill effects of chemical farming. There are several definitions of organic farming and the one given by the US Department of Agriculture (USDA) is considered the most coherent and stringent. It is defined as 'a system that is designed and maintained to produce agricultural products by the use of methods and substances that maintain the integrity of organic agricultural products until they reach the consumer. This is accomplished by using substances, to fulfill any specific fluctuation within the system so as to maintain long term soil biological activity, ensure effective peak management, recycle wastes to return nutrients to the land, provide attentive care for farrn

animals and handle the agricultural products without the use of extraneous synthetic additives or processing in accordance with the act and the regulations in this part'. The origin of organic farming goes back, in its recent history, to 1940s. During this period, the path breaking literature on the subject published by J.I. Rodale in the United States, Lady Balfour in England and Sir Albert Howard in India contributed to the cause of organic farming.

The farming being practiced for the last three decades in India has increasingly been found non-sustainable. The system is oriented towards high production without much concern for ecology and the very existence of man himself.

Relevance of Organic Farming

The relevance and need for an eco-friendly alternative farming system arose from the ill effects of the chemical farming practices adopted worldwide during the second half of the last century. The methods of farming evolved and adopted by our forefathers for centuries were less injurious to the environment. People began to think of various alternative farming systems based on the protection of environment which in turn would increase the welfare of the humankind by various ways like clean and healthy foods, an ecology which is condusive to the survival of all the living and non-living things, low use of the non-renewable energy sources, etc. Many systems of farming came out of the efforts of many experts and laymen. However, organic farming is considered to be the best among all of them because of its scientific approach and wider acceptance all over the world.

The International Scene

The negative effects of modem chemical based farming system were first experienced by those countries, which introduced it initially. So, naturally, it was in those countries organic farming was adopted in relatively large scales. There are very large organisations promoting the organic farming movement in European countries, America and Australia etc. These organisations, for example, the International Federation of Organic Agriculture Movements (IFOAM) and Greenpeace have studied the problems of the chemical farming methods and compared the benefits accruing to the organic faming with the former. Organic farming movements have since spread to Asia and Africa too.

IFOAM was founded in France in 1972. It spearheads and coordinates organic farming efforts the world over by promoting organic agriculture as an environment friendly and sustaining method. It focuses on organic farming by highlighting the minimum pollution and low use of non-renewable natural resources through this method. It has about 600 organisational members spread over about 120 countries including India.

IFOAM undertakes a wide range of activities related to organic farming such as exchanging knowledge and thoughts among its members; representation of the movement in governmental, administrative and policy making forums in the national and international arena; updating of production, processing and trading standards; formulation and coordination of research projects; and holding of international conferences and seminars. IFOAM participates in the activities related to organic farming under the auspices of the United Nations and keeps active contacts with several international NGOs.

In USA, there are large organic farms coming to thousands of acres and they raise crops using organic methods completely avoiding the use chemicals for manuring and controlling of pests and weeds. They implement crop rotations and lay emphasis on the timing of cultural operations

The Food and Agriculture Organisation (FAO) of the United Nations provides support to organic farming in the member countries. It also attempts the harmonization of national organic standards, which is absolutely essential to increase international trade in organic products. The FAO has, in association with the World Health Organisation (WHO), evolved the Codex Alimentarius for organic products.

Organic farming has several advantages over the conventional one apart from the protection of both the environment and human health. Improved soil fertility, better water quality, prevention of soil erosion, generation of rural employment, etc. are some of them.

Growth of Organic Farming

Organic farming has spread to about 100 countries around the world (Annexure - 1). An estimate in 2004 puts about an area of 24 million hectares under oi'ganic farming worldwide. Australia with its 10.5 million hectares leads the countries. However, much of this area is pastoral land for grazing. Argentina with 3.19 million hectares, Italy with 1.83 million hectares and USA with 0.95 million hectares follow suit. The importance of organic farming is growing in many countries. Austria and Switzerland have about 10 per cent of their food system under organic agriculture. The annual growth of organic farming is estimated to be about 20 percent in USA, France, Japan and Singapore.

The Developed World

Great strides have been made in organic farming by the western developed countries. We very often tend to put small farms in harmony with the organic farming system imagining that the large farms are not attuned for its adoption. In USA, there are large organic farms coming to thousands of acres and they raise crops using organic methods completely avoiding the use chemicals for manuring and controlling of pests and weeds. They implement crop rotations and lay emphasis on the timing of cultural operations.

Progress of Organic Farming in India

The first conference of NGOs on organic

farming in India was organized by the Association for Propagation of Indigenous Genetic Resources (APIGR) in October 1984 at Wardha. Several other meetings on organic farming were held at different places in the country towards the end of 1980s. Here, mention must be made of the Bordi Conference in Maharashtra, the state which was the focal point for the organic farming movement in India. The Rajasthan College of Agriculture with the support of the state government organized a meeting on organic agriculture in 1992. The United Planters' Association of South India (UPASI) organised two national level conferences on organic farming in 1993 and 1995. ARISE (Agricultural Renewal in India for a Sustainable Environment) is a major organization in the country engaged in the promotion of organic farming. ARISE was founded in 1995 at a national conference of organic farming held at Auroville. ARISE comprises of a supporting network of regional groups aiming at sustainable environment by protecting bio-diversity and promoting organic agricultural practices. The selection of Auroville for the conference was apt as it housed the Arabindo Ashram and the pioneering work under its auspices on building technology, alternative energy research, wasteland development, afforestation and organic agriculture.

By 1980, three groups of Indians had taken to organic farming. The first one consisted of urban educated technocrats for peripheral interest, which did not last long. Educated farmers consisted of the second group whose farming practices were based on scientific knowledge. The third group practiced organic farming through trial and error. The successful organic farmers in India are those who have access to sufficient natural resources like, water and other organic inputs mostly on their own farms. These farms produce crops like sugarcane, areca, cocoa, coconut, pepper and spices. Many of them have shown that switch over to organic farming do not affect yields and income and more importantly, knowledge/ expertise is available for successful adoption of organic farming in the country.

The International Federation of Organic Agriculture Movements (IFOAM) estimates that an area of about 41,000 hectares in India is under organic farming representing about 0.17 percent of the world organic acreage. It also reveals that the percentage of organic area to the total cultivated area comes to only about 0.03 percent and the total number of farms comes to about 5,661. But, a comparison of our 41,000 ha to Australia (10.5 million ha), Argentina (3.19 million ha], Italy (1.83 million ha), and USA (0.95 million ha) clearly indicates that organic farming in India has to go very far even to catch up with that of the leading nations of the world.

Non Governmental Organizations (NGOs) are spearheading organic farming in India. A report in 2002 indicates that about 14,000 tonnes of organic products have been raised in India. They include tea, coffee, rice, wheat, pulses, fruits, spices and vegetables. India exports organic agricultural produces to European Union, USA, Canada, Saudi Arabia, UAE, Japan, Singapore and Australia, among others.

The International Conference on "Indian Organic Products-Global Markets" at the end of 2002 was the first to be held in India. IFOAM predicts that India and China have great potential to be organic farm produce exporters in the future. An important event in the history of the modern nascent organic farming in India was the unveiling of the National Programme for Organic Production (NPOP) on 8"^ May, 2000 and the subsequent Accreditation and Certification Programme on P' October, 2001. The logo "India Organic" was released on 26'*' July 2002 to support the NPOP.

Progress

An important progress towards organic agriculture made by India is the increasing awareness of the ill effects of the modern farming system, which the country adopted about 35 years ago. The threat poised by the conventional food products to the human health and the damage done to the ecology are being viewed seriously. Efforts are made to produce healthy foods and the demand. for them is increasing. The importance of the marketing of the organic products is highlighted for the promotion of organic agriculture. Several individuals and associations have taken to organic farming and organic products are available in the large cities to a very limited extent.

Production and Exports

The aggregate production of organic agriculture came to about 14,000 tonnes during 2002 and the exports amounted to 11,925 tonnes.

Indian organic products are mainly

exported to Europe (Netherlands, United Kingdom, Germany, Belgium, Sweden, Switzerland, France, Italy, Spain, etc.), USA, Canada, Saudi Arabia, UAE, Japan, Singapore, Australia and South Africa.

Regulations

The most important step towards organic farming taken by the government was to draw a regulatory framework. It is true that the initiatives by the government to introduce organic farming by laying down regulations came belatedly as many countries have already done this kind of basic work decades ago. The implementation of NPOP is ensured by the formulation of the National Accreditation Policy and Programme (NAPP). The regulations make it mandatory that all organic certification bodies should be accredited by an Accreditation Agency. The international certification agencies operating in India even prior to these regulations will also have to get accreditation under the new dispensation.

The regulations lay down the institutional arrangements for implementing the national programme for organic production. The NPOP is administered, monitored and implemented for the benefit of farmers, processors, traders and consumers. It envisages a three tiered organisation under the overall guidance of the Union Government with the Department of Commerce, Ministry of Commerce and Industry as the nodal agency. Policy making and declaration of the standards for organic products, recognition of organic standards of other nations, efforts to get our standards recognized by others and coordination with other arms of the government for the successful management of the organic agriculture are the major functions entrusted to the ministry.

The agencies accredited are the Agricultural and Processed Food Products Export Development Authority (APEDA), Coffee Board, Tea Board and the Spices Board. The regulations cover exports, imports and the domestic trade of the organic products. But the government regulations are applicable to only the exports. So, an organic farm product can be exported only if it is certified by a certification body accredited for the purpose. The categories of products covered under accreditation are organic crop production, organic animal production, organic processing operations, wild products and forestry.

A national level steering committee is functioning as the apex advisory body for assisting the government to promote organic farming in the country. This body consists of representative's form the Ministries of Agriculture, Food Processing Industries, Forests and Environment, Science and Technology, Rural Development and Commerce.

Organic production requires certification after periodic inspections in order to ensure that all prescribed practices are followed. The inspection and certification are done by the agencies accredited to the Accrediting Agencies dealing with the commodity. Inspection and certification agencies can be government departments, NGOs, trade or consumer or producer organisations. Such agencies should be registered bodies, with managements in position, declaring the persons who shall be held responsible for any miscarriage of certification and having proof of adequate field staff to undertake periodic inspections. The continued accreditation of such bodies is dependent upon their record of fidelity to the principles of organic production. They are authorised to award certificates after due satisfaction that practices conformed to those enunciated by the Accrediting Agency in relation to the item concerned. The charges levied by the certifying agencies are fixed by the Accrediting Agencies.

Research and Training

A National Institute for Organic Farming has been established to spearhead research in organic agriculture. The government of India constituted task force had also recommended the initiation of the postgraduate level courses in organic farming. The Morarka Foundation and Maharana Pratap University of Agriculture and Technology (MPUAT), Rajasthan have collaborated in the design and implementation of such a programme.

Projects and Initiatives

Several projects and initiatives to promote organic farming in the country have begun at the behest of individuals and institutions. The following are only a few of such efforts the details which could be available.

A project aided by the World Bank to empower the rural communities in the country to grow organic products for exports had come up in 2002. The programme aims at the improvement and promotion of organic production of spices, certification and export of black pepper, white pepper, ginger, turmeric, cardamom, clove, nutmeg and herbals like rosemary, thyme, oregano and parsley. The implementation of the

progamme is done by the NGOs, and Idukki and Waynad districts of Kerala, Nilgiri district of Tamil Nadu and Kandhamal district of Orissa are the areas selected for the purpose. Imparting training to both the JNTGOs and the farmers on organic production methods, basic standards required, documentation, inspection and certification is a major objective of the programme. The assistance to NGOs includes among others computer hardware and software especially for market promotion of their produces.

In Haryana, an enterprising farmer who began farming on his 16 acre land in the Sonepat district in 1971 could establish an organic farm on 108 acres, raising vegetables and other crops (Rathi, et. al., 2003). It appears that his success is mainly attributable to the efforts made by him to market the products. NGOs functioning in the neighbourhood of Delhi buy the produces like rice, wheat, pulses and vegetables from his farm at a premium price of 30 to 50 percent. An exporting firm at a premium of 20 to 30 percent buys his basmathi rice. Almost 70 percent of his farm production is sold through advance agreements/contracts. Presently he and his friends are working with the resident associations in Delhi to market their organic products at a premium of about 25 percent.

In Rajasthan, the Morarka Foundation, established in 1995, promotes sustainable agriculture. It has about 10,000 partners producing vermi-compost and the Foundation is said to be the single largest producer of this organic input in Asia. It encourages the production of bio-pesticides and supports procurement of certified organic products. It has set up a joint venture to promote agri-biotechnology parks and a model park of such a nature has come up in Jaipur on 20 acres of land.

The campaign launched by the Foundation in the Sheldiawati region of the state in favour of organic farming has resulted in reduction of cultivation costs and improvement in the quality of the produces. Small and marginal farmers in the districts of Sikar and Jhunjhunu, who had been complaining of degradation of their agricultural land and declining productivity, were benefited. The efforts of the Foundation to popularize the use of vermi-compost in place of the chemical fertilizer by creating awareness and imparting training to the farmers have been successful. The Foundation too has a large facility to produce vermi-compost. Application of vermi-compost reduces irrigation, increases the flavour of the products and results in a decline in the damage to the crops by insects. The Foundation is presently engaged in developing techniques to enrich vermi-compost through micro-organisms to make it suitable for location and crop specific application.

Problems, Constraints And Prospects

It is quite natural that a change in the system of agriculture in a country of more than a billion people should be a well thought out process, which requires utmost care and caution. There may be several impediments on the way. An understanding of these problems and prospects will go a long way in decision making.

Problems and Constraints

The most important constraint felt in the progress of organic farming is the inability of the government policy making level to take a firm decision to promote organic agriculture. Unless such a clear and unambiguous direction is available in terms of both financial and technical supports, from the Centre to the Panchayath levels, mere regulation making will amount to nothing. The following are found to be the major problem areas for the growth of organic farming in the country:

Lack of Awareness

It is a fact that many farmers in the country have only vague ideas about organic farming and its advantages as against the conventional farming methods. Use of bio-fertilizers and bio pesticides requires awareness and willingness on the part of the farming community. Knowledge about the availability and usefulness of supplementary nutrients to enrich the soil is also vital to increase productivity.

Farmers lack knowledge of compost making using the modern techniques and also its application. The maximum they do is making a pit and fill it with small quantities of wastes. Often the pit is flooded with rainwater and result is the top of the compost remains under composted the bottom becomes like a hard cake. Proper training to the farmers will be necessary to make vermi-compost on the modern lines.

Attention on the application of composts/ organic manure is also lacking. The organic matter is spread during the months when the right moisture level is absent on the soil. The whole manure

turns into wastes in the process. The required operation is of course labour intensive and costly, but it is necessary to obtain the desired results.

Output Marketing Problems

It is found that before the beginning of the cultivation of organic crops, their marketability and that too at a premium over the conventional produce has to be assured. Inability to obtain a premium price, at least during the period required to achieve the productivity levels of the conventional crop will be a setback. It was found that the farmers of organic wheat in Rajasthan got lower prices than those of the conventional wheat. The cost of marketing of both types of products was also same and the buyers of wheat were not prepared to pay higher prices to the organic variety (Rao, 2003).

Shortage of Bio-mass

Many experts and well informed farmers are not sure whether all the nutrients with the required quantities can be made available by the organic materials. Even if this problem can be surmounted, they are of the view that the available organic matter is not simply enough to meet the requirements.

The crop residues useful to prepare vermi-compost are removed after harvest from the farms.and they are used as fodder and fuel. Even if some are left out on the farms termites, etc destroy them. Experiments have shown that the crop residues ploughed back into soil will increase productivity and a better alternative is conversion into compost.

The small and marginal cultivators have difficulties in getting the organic manures compared to the chemical fertilizers, which can be bought easily, of course if they have the financial ability. But they have to either produce the organic manures by utilizing the bio-mass they have or they have to be collected from the locality with a minimum effort and cost. Increasing pressure of population and the disappearance of the common lands including the wastes and government lands make the task difficult.

Inadequate Supporting Infrastructure

In spite of the adoption of the NPOP during 2000, the state governments are yet to formulate policies and a credible mechanism to implement them. There are only four agencies for accreditation and their expertise is limited to fruits and vegetables, tea, coffee and spices. The certiiying agencies are inadequate, the recognized green markets are non-existent, the trade channels are yet to be formed and the infrastructure facilities for verification leading to certification of the farms are inadequate.

High Input Costs

The small and marginal farmers in India have been practicing a sort of organic farming in the form of the traditional farming system. They use local or own farm renewable resources and carry on the agricultural practices in an ecologically friendly environment. However, now the costs of the organic inputs are higher than those of industrially produced chemical fertilizers and pesticides including other inputs used in the conventional farming system.

The groundnut cake, neem seed and cake, vermi-compost, silt, cow dung, other manures, etc. applied as organic manure are increasingly becoming costly making them unaffordable to the small cultivators.

Marketing Problems of Organic Inputs

Bio-fertilizers and bio-pesticides are yet to become popular in the country. There is a lack of marketing and distribution network for them because the retailers are not interested to deal in these products, as the demand is low. The erratic supplies and the low level of awareness of the cultivators also add to the problem. Higher margins of profit for chemical fertilizers and pesticides for retailing, heavy advertisement campaigns by the manufacturers and dealers are other major problems affecting the markets for organic inputs in India.

Absence of an Appropriate Agriculture Policy

Promotion of organic agriculture both for export and domestic consumption, the requirements of food security for millions of the poor, national self-sufficiency in food production, product and input supplies, etc. are vital issues which will have to be dealt with in an appropriate agriculture policy of India. These are serious issues the solution for which hard and consistent efforts along with a national consensus will be essential to go forward. Formulation of an appropriate agriculture policy taking care of these complexities is essential to promote organic agriculture in a big way.

Lack of Financial Support

The developing countries like India have to design a plethora of national and regional standards in attune with those of the developed countries. The adoption

and maintenance of such a regulatory framework and its implementation will be costly.

The cost of certification, a major component of which is the periodical inspections carried out by the certifying agencies, which have freedom to fix the timings, type and number of such inspections appears to be burdensome for the small and marginal farmers. Of course, the fees charged by the international agencies working in India before the NPOP were prohibitive and that was a reason for the weak response to organic agriculture even among the large farms in the country. No financial support as being provided in advanced countries like Germany is available in India. Supports for the marketing of the organic products are also not forthcoming neither from the State nor from the Union governments. Even the financial assistance extended to the conventional farming methods are absent for the promotion of organic farming.

Low Yields

In many cases the farmers experience some loss in yields on discarding synthetic inputs on conversion of their farming method from conventional to organic. Restoration of full biological activity in terms of growth of beneficial insect populations, nitrogen fixation from legumes, pest suppression and fertility problems will take some time and the reduction in the yield rates is the result in the interregnum. It may also be possible that it will take years to make organic production possible on the farm.

Small and marginal farmers cannot take the risk of low jaelds for the initial 2-3 years on the conversion to organic farming. There are no schemes to compensate them during the gestation period. The price premiums on the organic products will not be much of help, as they will disappear once significant quantities of organic farm products are made available.

Prospects

Indian agriculture should be able not only to maintain but also must strive to increase the production of foodgrains. It appears that given the availability of organic infrastructure, minimum efforts for conversion due to the low use of chemical farming methods and the limit of the public investment, organic farming can be progressively introduced. The potential areas and crops, which fulfill the above constraints, could be explored and brought under organic agriculture. The rainfed, tribal, north-east and hilly regions of India where the traditional farming is more or less practiced could be considered (Veeresh, 2003). Table - 11 gives the details of fertilizer consumption in the north-east and hilly regions of the country.

Agriculture production in these areas is still almost on the traditional eco-friendly lines and making the farmers aware of the methods of organic farming may not be very difficult.

A strategy to prevent sudden and substantial yield losses is to convert to organic production in phases to reduce the risks during the initial years. The question of the vast requirement of organic matter to the country's farms in order to switch over to organic agriculture is also answered. Chemical fertilizer is applied only in 30 percent of the cultivated area, which is irrigated, and the remaining land is under rainfed agriculture with almost no fertilizer application. Also the rainfed area under cultivation accounts for only 40 percent of the foodgrain production of the country (Veeresh, 2003). The introduction of organic farming in these areas will allay the fears of a sudden sharp decline of food production which many fear may drive the nation to food imports. Thus the demand for biomass for the production of organic manures can also be controlled in a phased manner. Moreover, the simple technologies with low input use have been developed for dry farming and they can be transferred to the farms for organic cultivation. The resulting increases in productivity and sustain-ability of production will increasingly contribute to the betterment of the economic condition of the dry land faming community, which is one of the poorest in the country.

Conclusion

The ill effects of the conventional farming system are felt in India in terms of the unsustainablity of agricultural production, environmental degradation, health and sanitation problems, etc. Organic agriculture is gaining momentum as an alternative method to the modern system. Many countries have been able to convert 2-10 percent of their cultivated areas into organic farming. The demand for organic products is growing fast (at the rate of 20 percent per annum in the major developed countries).

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India's Role in World Agriculture

India is one of the fastest growing economies of the world and is currently the focus of a great deal of international attention. It is the seventh largest country in the world in terms of its geographical size. Today it has a population of nearly 1.1 billion which makes it the second most populous nation in the world. With current population growth by 2025 India may even have caught up with China according to the UN.

In this MAP we focus on agriculture and especially on agriculture trade. India has a large and diverse agriculture and is one of the world's leading producers. It is also a major consumer, with an expanding population to feed. For this reason and because of its agricultural and trade policy, its presence on the world market has been modest in relation to the size of its agriculture.

India is still a big unknown. While it has been a small net agricultural exporter overall since 1990, in recent years there have been many changes in its agriculture and trade policies and significant changes in its net trade position for many individual products.

The leading forecasting institutions expect that India will play a bigger role in world markets in future. In a number of markets it is expected to consolidate its position among the world's leading importers (vegetable oils) and exporters (rice). Given the size of Indian agriculture, changes in its balance sheets for key commodities have a potentially large impact on world markets.

Economic Developments

India is the third largest economy in Asia after Japan and China, as measured in terms of its Gross Domestic Prod-uct (GDP) and it is continuing to grow rapidly.

The Indian economy has seen high growth rates of more than 8 percent since 2003. In 2005 and 2006 GDP grew at a rate of over 9 percent. Globally India's growth is surpassed only by that of China. This is expected to continue with growth just under 7 percent by 2015. Graph 1 compares GDP growth in India, China and Brazil, where growth has been much slower.

High growth rates have significantly reduced poverty in India. However it's GDP per head is still very low (estimated at US$ 820 in 2006), so it remains classified by the World Bank as a low income country. The World Development Report 2008 states that over one third of the population of India was living below the poverty line in 2004-2005, managing on less than $1 a day.

Cereals are the staple food in India, providing over half the calories consumed, while pulses are the main protein supplement in the diet. Rising incomes and the influence of globalisation have contributed to changes in the diet with a slight decrease in cereals consumption and an increase in pulses, edible oils, fruits and vegetables, milk and meat, which is growing from a low base. In the case of edible oils, the fall in prices after the liberalisation of imports further stimulated

consumption. However although diets are diversifying, India still lags behind Brazil and China in terms of daily calorie intake per capita.

Agricultural Policy

Indian agriculture policy is aimed essentially at improving food self sufficiency and alleviating hunger through food distribution. Aside from investing in agricultural infrastructure, the government supports agriculture through measures including minimum support prices (MSP) for the major agricultural crops, farm input subsidies and preferential credit schemes.

Under the price support policy, MSPs are set annually for basic staples to protect producers from sharp price falls, to stabilise prices and to ensure adequate food stocks for public distribution. In the past guaranteed prices have been below the prevailing market prices, according to the International Food Policy Research Institute (IFPRI) in 2007.

At the same time subsidies on farm inputs including fertilisers, electrical power and irrigation water have led to inefficient use of inputs and indirectly subsidise income. IFPRI concluded that "support for agriculture (from 1985-2002) has been largely counter cyclical to world prices".

OECD appears to reach a similar conclusion. Its 2007 monitoring report points out that the level of agricultural support (covering transfers from taxpayers and consumers) for India "would appear to be slightly below the OECD average but considerably higher than that of the emerging economies reviewed by the OECD". Furthermore the instruments of support used are "the least efficient and the most trade distortive forms of support".

Key Agricultural Sectors

India is among the world's leading producers of paddy rice, wheat, buffalo milk, cow milk and sugar cane. It is either the world leader or the second largest producer in eight out of its top ten products. Some of these are widely traded while others are more specialist products.

Table 2 shows the composition of production by value for 2003-2005, when paddy rice was the top sector, followed by buffalo milk and wheat. India is now the largest milk producer in the world and the second largest producer of paddy rice, sugar cane, wheat, cow milk, groundnuts and certain fresh vegetables. But it is also a leading consumer. So although it exports these products the quantities will vary depending on the size of the crop and demand.

Table 2: Top 10 sectors of India & world rank

Commodity	Rank India	World Rank 2005	Production Avg 2003-2005	
			Billion $	Million T
Paddy rice	1	2	27.5	129.2
Buffalo milk	2	1	25.2	50.5
Wheat	3	2	10.9	69.7
Cow milk	4	2	10.0	37.5
Fresh vegetables	5	2	6.6	34.9
Sugar cane	6	2	5.2	250.0
Potatoes	7	3	3.6	25.0
Groundnuts	8	2	3.4	7.1
Pimento	9	1	3.3	1.1
Buffalo meat	10	9	3.1	1.5

Source: FAOSTAT, world rank calculated by DG AGRI

Meanwhile India is the world leader in such specialist products as buffalo milk, spices (pimento) and bananas, mangoes, chickpeas etc., which are important in the Indian diet and are also exported.

And India is the fifth largest cultivator of biotech crops in the world, ahead of China. In 2006, about 3.8 million hectares of land were cultivated with genetically modified crops, by about 2.3 million farmers. The main GM crop is Bt Cotton, which was introduced in 2002.

Trade

Reforms introduced in India in the early 1990s have greatly increased overall trade flows. However it has consistently run a trade deficit unlike China and Brazil (US$35 billion in 2004-2005).

The EU (27) ranks as India's largest trading partner accounting for about 21 percent of total Indian trade in 2005, ahead of the United States and China. Meanwhile India is the EU's tenth largest trading partner accounting for 1.8 percent of total trade. In 2005 its trade deficit with the EU was about €2 billion.

India is one of the leading members of the G-20 within the DDA negotiations. It has a preferential trade agreement with Mercosur since 2005. It is also part of the South Asia Free Trade Agreement (SAFTA) covering seven nations (India, Bhutan, Nepal, Sri Lanka, Pakistan, Bangladesh and the Maldives) which came into effect in January 2006 with the aim of reducing tariffs for regional trade. And it is currently negotiating Free Trade Agreements with the EU and ASEAN. Turning our focus to trade

in agricultural and food products; this accounts for a relatively small share of overall Indian trade. Agricultural exports represent 9 percent of the value of total exports while the share of agriculture in total imports is just 5 percent.

When compared with other main players on world markets and considering the size of the country, Indian agricultural trade flows appear relatively modest. As the key goal of agricultural policy since independence has been to achieve self-sufficiency, trade has been relatively limited. However technological developments and macroeconomic policy reforms have brought increased liberalisation, following the implementation of the Uruguay Round Agreement, and have contributed to changes in agricultural trade.

Thus India is a net exporter of agricultural food products with a small surplus of just under $4 billion. Between 1993-1995 and 2003-2005, exports nearly doubled while imports grew almost threefold. The value of exports grew from $4 to $7.7 billion while imports rose from $1.8 to $5.2 billion within a decade.

The balance of agricultural trade has always been in surplus though there were sharp fluctuations during the nineties. Since 2000 both imports and exports have grown steadily.

India's Main Export Partners

India is diversifying its export markets. The EU remains its top market, accounting for 16 percent of the value of export sales in 2003-2005, although this is a decline from 21percent a decade ago. ASEAN is in 2nd place with 14 percent, although its share has also fallen.

This trend may be reversed however as India is negotiating Free Trade Agreements with the EU and with ASEAN. Meanwhile trade with neighbouring Bangladesh and China (currently 7.5%) is growing fast. The US market share has remained steady at 10 percent and also that of Saudi Arabia.

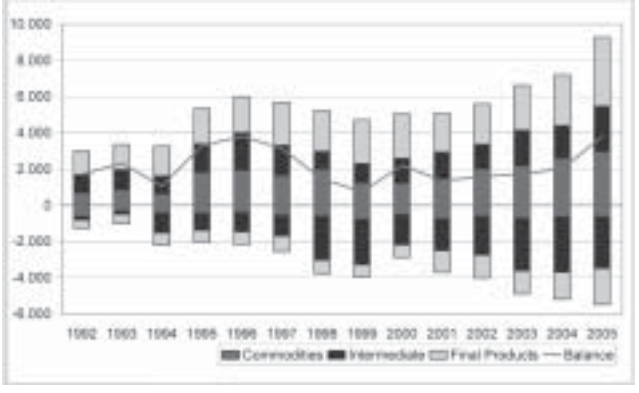
A Closer Look at India's Imports

ASEAN is by far the biggest supplier of agricultural products to India, accounting for a massive 40 percent of its imports in 2003-2005. Argentina and Brazil rank 2nd and 3rd respectively while the EU only has 4 percent market share (down from 7% a decade ago), ranked at number six in 2003-2005. While this is roughly equivalent to the share of imports from China and the United States, it is far below the share enjoyed by Mercosur (supplying about 17% of imports) and ASEAN countries. Over the past decade ASEAN and Argentina have both substantially increased their market share at the expense of the US, the EU, Brazil and China. Together the top six suppliers now account for over 70 percent of imports.

India's agricultural imports are focused mainly on intermediate products. These account for 56 percent of imports; final products are 31 percent, while the share of commodities is just 13percent. The biggest growth has been in intermediate products which increased nearly fourfold over the period.

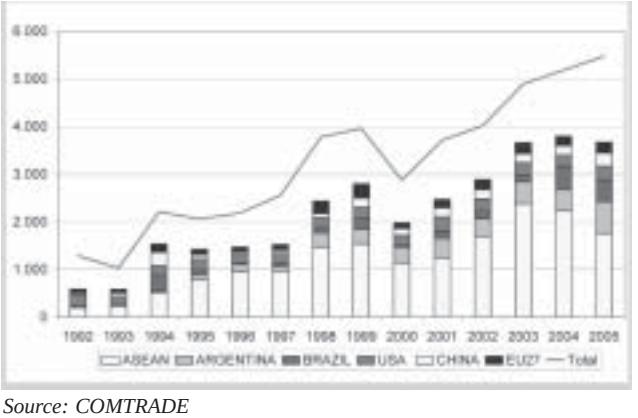
This reflects the importance of vegetable oils in Indian imports. Palm oil is by far the biggest import at 29 percent of the total. Together with soybean oils, they represent over 40 percent of imports. Protein rich peas are also within the top 5. The increase in imports of these foodstuffs is driven by population growth. While cashew nuts and cotton are among the top exports, they also appear in the top 10 imports. Cashew nuts are imported

Structure of Indian agricultural trade (million $)



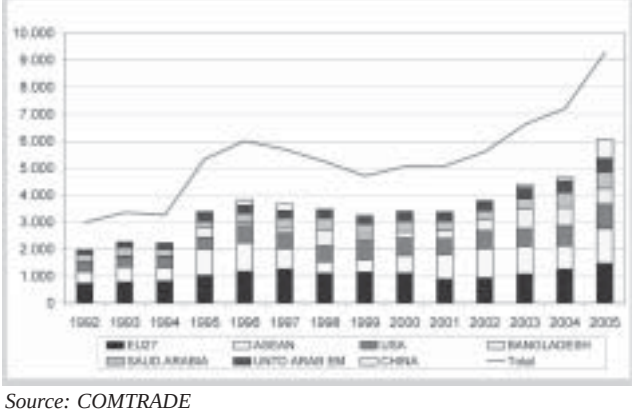
Source: COMTRADE

India agri-food imports by origin (million $)



Source: COMTRADE

Indian agri-food exports by destination (million $)



Source: COMTRADE

India is forecast to consolidate its position among the world's leading exporters of rice (its top export), though the volume of exports has been erratic since the mid nineties (depending on the size of the crop and on domestic consumption)

for further processing as are silk and cotton, which are used in the Indian textile industry.

Outlook for Agriculture and Trade

OECD and FAPRI (Food and Agricultural Policy Research Institute) both expect India to play a bigger role in world markets in future. It is likely to remain a small net exporter overall.

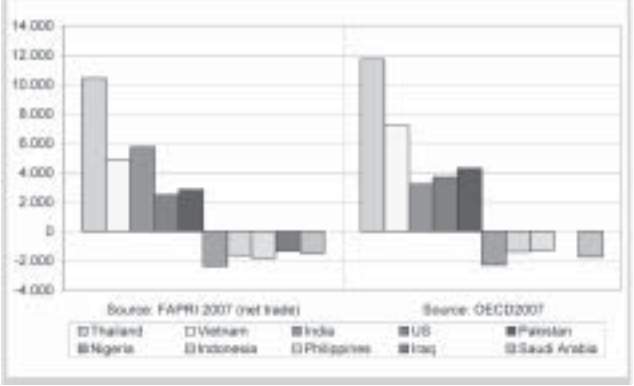
India is forecast to consolidate its position among the world's leading exporters of rice (its top export), though the volume of exports has been erratic since the mid nineties (depending on the size of the crop and on domestic consumption). Currently it is the second largest rice producer after China and the third largest net-exporter after Thailand and Vietnam.

FAPRI expects it to increase its world market share from 16 percent to 20 percent by 2015 as area and yields increase and per capita consumption declines. OECD meanwhile takes a more conservative view of production prospects and therefore of export potential. FAPRI's and OECD's projections for the global rice trade.

Its world market share is expected to rise from 4 percent to 6 percent over the coming decade, thanks to robust growth in production (second only to Brazil's) and a slowdown in consumption growth. For soya meal India's world market position is relatively stable and it is expected to stay at about 6 percent world market share (FAPRI).

Indian buffalo beef exports are projected to grow as production rises faster than demand, with world market share for beef stable at around 11 percent. On the dairy side, net exports of

Evolution of World Rice Trade ('000t) Average 2014/15 to 2016/17



butter and SMP will also grow. For butter although there is a strong increase in production, this is in response to surging demand growth, so India remains a small net exporter. On the other hand it becomes a significant net exporter of SMP, with its share of world trade rising from 4 percent to 6 percent.

Conclusions

Agriculture occupies a prominent position in Indian policy-making not only because of its contribution to GDP but also because of the large proportion of the population that is dependent on the sector for its livelihood.

The growth in population and wealth has stimulated demand to the extent that domestic production has not always been able to keep up and there is increasing speculation that the Indian economy may be overheating leading to inflation. The downside of the increased import demand and the current commodity boom is that India's food import bill will rise sharply.

However it is clear that India's agricultural sector has made huge strides in developing its potential. The green revolution massively increased the production of vital food grains and introduced technological innovations into agriculture. This progress is manifested in India's net trade position. Where once India had to depend on imports to feed its people, since 1990 it is a net exporter of agri-food products. Its agriculture is large and diverse and its sheer size means that even slight changes in its trade have significant effects on world agricultural markets.

How India will develop is still a big unknown, with the picture changing rapidly. Questions have arisen about India's capacity to compete in global markets under the current farm structure and farm policy. As the service economy grows, the share of agriculture will diminish, which may also have implications for India's stance on trade and agriculture policy in the future.

excerpts from a report by World Bank

The Paradox and Challenges of Indian Agriculture

By **Joachim von Braun, Ashok Gulati, Peter Hazell, Mark W. Rosegrant and Marie Ruel***

Indian agriculture is facing a policy paradox. Although several forecasts of the 1990s predicted that India would be a large importer of grains in the years to follow, in fact from 2001 to 2004 India exported around 30 million tons of foodgrains. It was seeking primarily to liquidate its bulging grain stocks, which reached 63 million tons in July 2002. Whereas India's agricultural policy is still rooted in the goal of self-sufficiency in grains, consumption patterns are changing fast toward high-value agricultural products such as fruits and vegetables, livestock products, and fish. The policy environment is lagging behind the structural change occurring in India's consumption and production baskets. On another front, foreign exchange reserves, which had reached a rock-bottom US$1.2 billion in July 1991, climbed to more than US$120 billion by the end of 2004. Nonetheless, despite comfortable food and foreign exchange reserves and reasonably high growth in gross domestic product (GDP) of about 6 percent annually, India still has more than 250 million underfed people (below the poverty line) and high under-employment. This situation reflects severe problems on the distribution front.

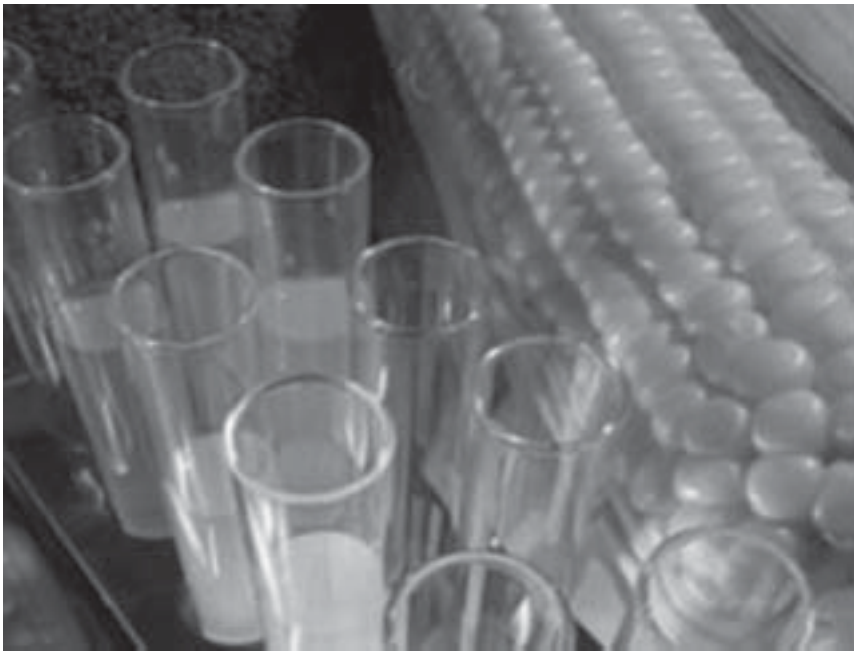
What are the reasons behind this paradoxical situation? The answer presumably lies in the neglect of, as well as misallocation of resources in, agriculture and rural development, especially in the later phase of the reform process initiated in 1991. The average annual rate of growth in agriculture fell from more than 4 percent per year during 1992/93 to 1996/97 to less than 2 percent per year during the period 1997/98 to 2002/03, and it remains low. What led to this dramatic decline in the growth of agriculture since 1997/98? How can it be revived? How can growth in agriculture and rural development diminish poverty quickly? To stimulate pro-poor agricultural growth and rural development, India will need to make some strategic choices. We propose action in five major areas that can help the government to accelerate agricultural growth and reduce poverty, malnutrition, and unemployment quickly and on a sustainable basis. All of these reforms can be achieved with due regard for the well-being of the country's rural poor.

Enhancing Pro-Poor Rural and Agricultural Investments and Cutting Subsidies

Since the early 1980s public investment in agriculture has experienced a secular decline, while input subsidies (on fertilizers, power, and canal irrigation) have been rising. In the early years of economic reforms, an attempt was made to arrest and reverse these trends (see Figure 1), but this effort could not be sustained. As a result the gap between investments and subsidies kept widening. Today input subsidies, together with food subsidies, amount to roughly five to six times the public investment in agriculture. With a burgeoning subsidy bill and shrinking public investment, the growth impetus for agriculture has been declining. Private investment in agriculture has been increasing, yet it has not fully compensated for the loss from falling public investment.

The first strategic decision must be to raise the level of public investment in agriculture and in rural India. This move would also help unleash private sector investment, which complements public investment. The strategy should be to contain and target subsidies and plow the savings back into agriculture as investment.

IFPRI research shows that investments in R&D have the highest impact on agricultural growth per million rupees invested. The rates of return to public



investment in research have been as high as over 60 percent, and in extension, over 50 percent. India currently invests only about 0.5 percent of its agricultural GDP in agricultural research, compared with 0.7 percent in the developing countries as a whole and as much as 2–3 percent in the developed countries. These figures suggest that government has been systematically underinvesting in a sector that offers a high social return and that there is considerable scope for diverting incremental outlays to priority areas in research.

Investment in rural roads has the most potent effect on poverty alleviation, per million rupees invested, followed by investment in R&D. Across regions, the returns on each million rupees invested in the less-favored (rainfed) areas of western and southern India are now higher than in the irrigated tracts of the northwest. These rainfed areas were largely bypassed by the Green Revolution. Thus any investment in this region has a win-win potential in terms of both higher returns (efficiency) and equity.

In R&D, India had a successful record of importing highyielding seed varieties and adapting them to local conditions during the late 1960s and 1970s, an effort that led to the Green Revolution. Although there is still ample scope for increasing rice and wheat yields, especially in the water-abundant eastern belt, the Green Revolution has been stagnating in the northwest states of Punjab, Haryana, and western Uttar Pradesh, as well as in the southern states of Andhra Pradesh and Tamil Nadu. To keep pushing the production frontier outward, India must invest in new technologies and the institutions to accompany these technologies. The new agricultural technologies on the horizon are largely biotechnologies. Indian policymakers, scientists, and regulators have long supported the development of biotechnology (including genetic modification) that provides new crops favorable to India's climatic areas and is suitable for use by farmers in rural communities. One of the most important technologies in the Indian context is one that produces drought resistance. Developing biotechnology appropriately, however, will require effective research and reforms of the regulatory structure and process, duly recognizing the local and international debate on biotechnology, particularly regarding genetically modified (GM) crops. In this context, setting up a body like the National Biotechnology Regulatory Authority (NBRA) would enhance regulation of biotechnology in India.

Investments in advanced crop technologies for Indian farmers will pay off only if there are accompanying investments in infrastructure. The connection of India's villages to information and communications technology is an important component of these initiatives. The private sector can be the key driving force, and many corporate giants have already entered rural areas with a view to expanding business. But public policy should facilitate these investments in rural areas by removing controls on private investment as well as by offering tax concessions for investing in rural areas, in order to improve poor communities' access to education, market information for farmers and other small businesses, and service information.

Investing in appropriate institutions is as important as investing in agricultural R&D and infrastructure. Institutional changes are required to ensure greater transparency and accountability in implementing agencies. India faces endemic problems stemming from poor staff incentives and a lack of financial autonomy, accountability, and transparency in its public sector agencies. The best solution is likely to be selective privatization that takes into account both equity and efficiency considerations.

Public investment needs to be made more pro-poor and productive through decentralization. Community participation in constructing and maintaining rural infrastructure is crucial for the efficient operation of financial incentives and the establishment of a legal framework. The typical top-down approach followed so far in public investments will not give the desired results. Heavy participation of user groups and nongovernmental organizations (NGOs) in maintaining public infrastructure is required to turn the process of rural development from top down to bottom up.

Reforms with a Human Face

Addressing the Landless Poor Reforms in the agricultural sector are an important step toward increasing growth rates in the Indian economy and thus reducing poverty sustainably. But many households are not in a position to share in economic growth because of their low asset base (for example, poor nutrition, low education, and few physical assets). Studies reveal that there is typically little

mobility out of extreme poverty, and many households remain poor for generations.

Indeed, low human capital status and an inability to build up a minimum physical asset base play a key role in the intergenerational transmission of poverty. Any credible, broad-based development strategy must therefore involve public policies aimed directly at promoting asset accumulation by chronically poor households. In addition, the labor productivity of the poor is currently impaired by nutrition problems, including "hidden hunger" in the form of micronutrient deficiencies. Agricultural research and production programs should focus on addressing these deficiencies through supplementation, fortification of foods (including complementary foods), and attention to making low-cost foods that are rich in micronutrients.

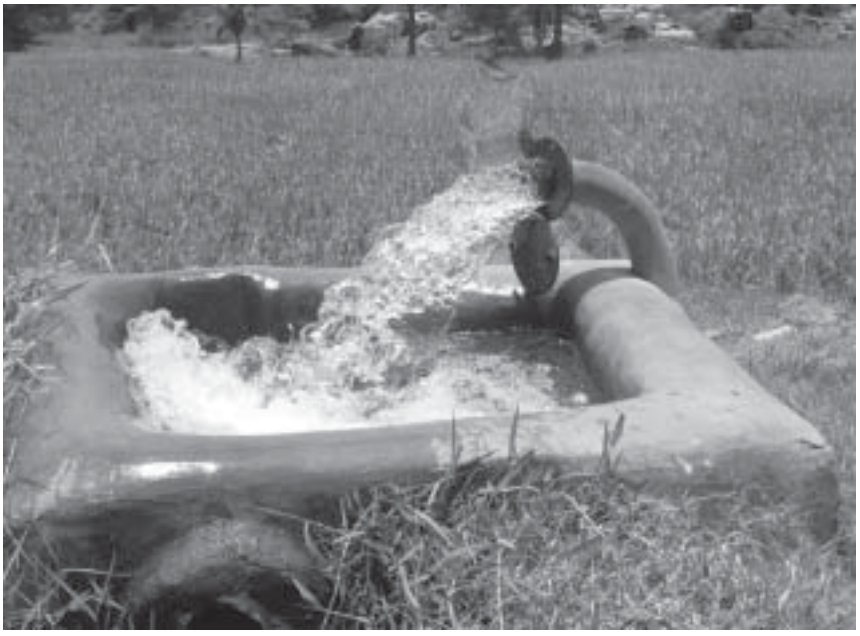
India is home to a wide range of social safety net programs that together attempt to address the needs of poor households at various stages of the life cycle. For households with young children, the Integrated Child Development Scheme (ICDS) provides take-home food rations linked to acquiring nutrition guidance and crucial health care. To promote higher educational attainment, the Mid-Day Meals Program provides meals to children attending school. The Public Distribution System (PDS) provides subsidized food rations to poor households through a vast network of fair-price shops. A range of community public works programs (such as Jawahar Gram Samridhi Yojana or Employment Guarantee Schemes [EGSs]) provide employment to the poor during periods of economic downturn or during the slack agricultural season. The National Old-Age Pension program and the Annapurna program provide cash to destitute elderly households without alternative family support. These programs should be transformed from social assistance to social development programs that contribute directly to the creation of physical and social assets.

Although safety net programs in India vary widely and absorb substantial public funds, their combined effectiveness is questionable. Rationed food subsidies are often poorly targeted, and corruption prevents much of the food from reaching the intended beneficiaries. For example, 53 percent of India's rural poor live in three states (Bihar, Uttar Pradesh, and Madhya Pradesh), but their dependence on subsidized food through the PDS off-take is only between 5 and 10 percent of their total cereal consumption–too little to make much difference in their food security. The costs associated with public distribution of food are also often unnecessarily high.

There is a need to rationalize wages in public works programs, walking the line between too-high wages, which will result in leakage of transfers to nonpoor households, and too-low wages, which will undermine the very objective of the programs–that is, poverty alleviation. These two considerations need to be balanced, in line with minimum wage regulation. In addition, high costs associated with managing the creation of assets through public works programs absorb scarce resources, and the resulting projects are often of low quality or never benefit the poor. The economic inefficiencies associated with financing these safety net and public works programs can also be substantial, as is the case with foodgrain support prices that distort production incentives. These different safety net programs are often poorly integrated, with some households receiving benefits from a number of sources and other poor households being completely excluded. As a first step, existing social safety net programs in India need to be revisited to assess their targeting mechanisms, coverage, cost-effectiveness, and overall impact on poverty alleviation. Research at IFPRI, along with several studies in India, shows that programs like the EGS of Maharashtra to build rural infrastructure are more cost-effective in reaching the poor than is the untargeted PDS. These public works schemes need to be scaled up to build rural infrastructure, develop and preserve watersheds, undertake forestation, desilt canals, and so forth.

Bangladesh's Food for Education (FFE) scheme and India's own ICDS show that targeted programs have been highly successful and are worth investigating. Under the FFE scheme, the poor family of the school-aged child gets a quantity of subsidized food as long as the child attends school. This program ensures higher attendance in village schools, especially of girls, and provides food security to the poor. Such a program may be worth implementing in India on a pilot basis.

Achieving reforms for the landless poor requires developing and applying credible evaluation techniques that can then inform the design and implementation of programs. Given budget constraints and the extent of poverty in India, the country cannot afford to tackle the problem of assisting the landless poor without substantial improvements in the cost-effectiveness of the overall social safety net system. Fortunately, we have learned much from diverse experiences in several developing countries, and the wide



variation in program performance across Indian states may also be a valuable source of lessons for future policy reforms.

Addressing the Water Challenge

Rapid growth in nonagricultural water demand, the unsustainable overdraft of groundwater, and a slowdown in the growth of water supply investments are leading to growing water shortages for agriculture in much of India. These shortages are likely to worsen in the coming years if business as usual continues, and the local impacts on agricultural employment and rural livelihoods could be severe. Concerted policy efforts, however, could significantly mitigate the negative effects of growing water shortages.

The ultimate irrigation potential of the country is roughly 140 million hectares, of which not more than 70 percent has been exploited. During the Ninth Five-Year Plan (1997–2002), irrigation grew at only about half of its target rate. Large investments would be required to complete several hundred irrigation schemes that have gone unfinished for years because of severe resource constraints. Additional resources for those projects nearing completion would bring high returns to investments already made. Part of the solution to water scarcity, however, lies outside of the irrigation sector. Increased investments in agricultural research could boost agricultural productivity to compensate for the diversion of water from agriculture to domestic and industrial uses. Crop research needs to target rainfed production as well as irrigated areas, taking pressure off the irrigated crops sector. In the domestic and industrial water sectors, improving both efficiency and equity through increased water prices would provide incentives for conservation, cover the costs of delivery, and generate adequate revenues to finance the needed growth in supplies and expanded coverage of clean piped water. At the same time, pressure on water transfers from agriculture would be reduced.

Generalized domestic and industrial water subsidies need to be replaced with subsidies targeted to the poor. In the irrigation sector, water policy should be designed to induce investment in improved technology and conservation of water and to encourage diversification away from irrigated cereals into crops that give more value per unit of water. It is feasible to design and implement water pricing systems on the basis of water rights that would introduce positive incentives for efficient water use and crop diversification, recover operations and maintenance (O&M) costs, and protect and even increase farm incomes. Water rights, combined with appropriate incentives, are essential for establishing rational water allocation because they provide users with the security to invest in water-saving technology and practices. Because of the large number of small farmers in Indian irrigation systems, in most cases it is preferable to assign water rights to water user associations rather than to individual farmers. A water brokerage system with a river basin authority, or an irrigation system that brokers water trades among irrigators and between irrigation and nonirrigation water uses, could establish incentives to use water efficiently without reducing farm incomes.

A base water right would be established at major turnouts to water user associations. The user group would be responsible for internal water allocation. A fixed base charge would be applied to the initial (historical) quantity, sufficient to cover O&M and longerterm asset replacement (depreciation) costs. For demand above the base water right, a price equal to the value of water in alternative uses would be charged to users; for demand below the base right, the same price would be paid to the water user for not using the water. This system would facilitate the mutually agreed purchase and transfer of water to higher-valued uses. The promise of efficient water use and the allocation of water resources without harming the welfare of irrigators and other rural water users make the establishment of water rights, together with appropriate incentives, one of the highest priorities for water reform.

Toward High-Value Agriculture

Given sustained increases in per capita incomes of about 4 percent per year during the past two decades, consumption patterns in India are changing away from cereals to high-value agricultural products. How fast has the consumption basket of an average Indian changed? Data from the National Sample Survey Organisation (NSSO) show that per capita consumption of cereals from 1977 to 1999, for example, declined from 192 to 152 kilograms per year in rural areas and from 147 to 125 kilograms in urban areas. The consumption of fruits, on the other hand, increased by 553 percent, of vegetables by 167 percent, of milk and milk products by 105 percent, and of meat, eggs, and

fish by 85 percent in rural areas over the same period. Similar changes occurred in urban diets. These dramatic changes indicate a structural shift in Indian diets. Add to this the new export market opportunities for many of the same products, owing to trade liberalization, and there is a happy match between the demands of the market and the need for farmers to diversify into higher-value activities. Further, high-value agricultural products have higher employment elasticity and can be suitable for smallholders, if they can participate.

In this new situation, more of the energies and resources of the agricultural sector can be unleashed to produce the kinds of high-value foods and products that are now in high demand by India's growing middle classes and urban dwellers and that have new export market opportunities. A reinvigorated agricultural and agribusiness sector could thus continue to be a major engine of income and employment growth for the country. Despite the tremendous opportunities ahead, success is not yet assured. Important challenges will need to be overcome. The first challenge is to further shift the government's priorities from heavy support and protection of food staples to promotion of agricultural diversification, processing, and commercialization. Simply put, most farmers are not going to get rich by growing cereals when there are already national surpluses, demand growth is slow, and world markets are glutted with the subsidized production of rich-country farmers. Farmers must shift into higher-value products to increase their incomes.

A set of public policies and investments is required to fully unleash this new potential. This set must include additional public investment in the kinds of rural infrastructure and technologies needed for these new high-value activities, improvements in marketing and distribution systems for higher-value and more perishable foods, and further liberalization of the agroindustrial sector. The private business sector can and should play a dominant role in these higher-value market chains, and public policy must strengthen the enabling environment. This change will require a fundamental shift in thinking in many public agencies that are still geared toward the dominant role that the state played in the market chains for food staples during the Green Revolution era.

Although some of the funding for these new investments will come from the private sector, new public investments are also needed. The needed funds might be obtained by reducing some ofthe huge subsidies that are still maintained on fertilizers, credit, and water for the food staples sector and that no longer serve a useful purpose. This could be a win-win strategy for farmers and the government and at the same time could contribute to national economic growth.

The second challenge for the "new" high-value agriculture is to make it pro-poor. Left to market forces alone, the major beneficiaries of the new high-value agriculture will be mostly the larger and commercially oriented farms, as well as farms that are well connected to roads and markets. The majority of the 300 million or so poor people in India are rural people who depend on agriculture for their living, and many live in the less-favored regions. These people must not get left further behind during the next phase of India's agricultural development.

Fortunately, there is great opportunity to guide the new highvalue agriculture so that small farms and even many less-favored regions can be major participants. Achieving broad participation will require improving infrastructure and education in many lessfavored regions and communities, ensuring that small farms get the technologies and key inputs they need, and promoting producer marketing organizations that can link small farmers to the new market chains (supermarkets, contractors, processors, exporters, and the like). Small farmers cannot do all of these things on their own, and the public sector, private sector, and NGOs all have important roles to play.

Because high-value agriculture demands more working capital, which small farmers often lack, a major effort must be made to reform the rural credit delivery system to reach smallholders. Innovative institutions promoting vertical coordination between farms, firms, and

The consumption of fruits, on the other hand, increased by 553 percent, of vegetables by 167 percent, of milk and milk products by 105 percent, and of meat, eggs, and fish by 85 percent in rural areas over the same period. Similar changes occurred in urban diets

forks (supermarkets) would reduce transaction costs and market risks and would also act as a conduit to funnel more credit into this venture, especially for smallholders. This system would help lay a foundation for globally competitive agriculture in which smallholders can also participate and prosper. Public policy can make a major contribution by facilitating farmer organizations, standardization, transparent food safety policies, and contract security between farmers and the processing and retail industry.

A third challenge will be overcoming many of the environmental problems that now plague agriculture. Water scarcities will continue to grow, and farmers must learn to use less water and to be less polluting. Land degradation and deforestation must also be contained. A shift toward more diversified and higher-value farming systems will help, both because many of the new crops need less water and because, by increasing returns to land, small farmers will have less need to overexploit poor lands and soils.

Although agriculture can make a significant contribution to growth, employment creation, and poverty reduction, on its own it will not drive the full economic transformation that is now possible for India. A fourth challenge, therefore, is for policymakers to find ways of accelerating growth in the service and manufacturing sectors, which will require continued economic liberalization and privatization.

Trade and Market Policy Reforms

The policy reforms of the 1990s more or less eliminated the bias against agriculture by lowering industrial tariffs and liberalizing exports of agricultural commodities. This change improved the relative incentives environment (measured as the ratio of agricultural prices to prices of manufactured goods) in favor of agriculture, providing a strong boost to private sector investments in agriculture.

The liberalization of agricultural exports also led to a major upswing in agricultural exports, at least from 1992/93 to 1996/97. But the years 1997/98 through 2002/03 did not augur well for agricultural exports. The world prices of most agricultural commodities fell sharply, primarily triggered by the East Asian crisis. This decline highlighted the difficulties in integrating domestic agricultural markets with world markets. Whereas developed countries such as the United States and the European Union countries resorted to subsidizing their farmers, developing country policymakers did not have many options and accepted the loss of those markets.

This outcome raises the fundamental issue of establishing and strengthening a rule-based system in the global trade of agricultural commodities. In an increasingly interdependent world, it is neither desirable nor feasible to remain insulated from global markets. India, as a major player in the developing world, should play its due role in WTO negotiations and push for multilateral global liberalization of agricultural trade. Although India should insist on substantial cuts in the export subsidies and domestic support being provided to agriculture in the Organisation for Economic Co-operation and Development (OECD) countries, it should also be ready to open up its own markets step by step. Major trade increases are going to take place within the developing world over the next two decades or so, and therefore it would be in India's interest to form a strong coalition of developing countries to open markets while pressing for reducing distortions in developed-country agricultural policies. India's role in the G20 coalition at Cancun proved strong in putting pressure on the OECD countries, but India and its coalition partners Brazil, China, South Africa, and others must engage further to break the deadlock and argue for rules-based open trade. In the event of a slowdown in multilateral negotiations, given the complexities, India should open a second track of negotiations on bilateral and regional free trade agreements with major developing countries in the region (like China) and beyond (like Brazil and South Africa). India can harvest rich returns from trade liberalization, provided it also carries out large-scale reforms to streamline domestic markets and put in place the infrastructure and institutions to connect local markets with national and global markets. These reforms would involve removing all controls on the functioning of domestic markets, such as movement restrictions, stocking limits on private trade, levies on rice and sugar mills, controls on investments in large-scale agroprocessing and on foreign investments in retail chains, and bans on direct buying from farmers by processors. India should also introduce new institutions such as futures trading that can reduce market risk and promote investments. Further, to integrate the domestic markets with world markets smoothly and manage trade liberalization more effectively, India needs institutions that can closely monitor movements in world and domestic prices and take timely and appropriate actions to avoid major

India should reorient its social safety nets to create more employment in rural areas; help strengthen the human resource base through education, nutrition, and empowerment of women; and build physical infrastructure

shocks. Here, an institution like an agriculture tariff commission may be more useful than the existing Commission for Agricultural Costs and Prices.

Summary

In summary, we suggest five areas for action to put rural India on a higher growth trajectory that would cut hunger, malnutrition, and unemployment at a much faster pace than has been the case so far. The five areas for action are interlinked and would best work if pursued in conjunction. We emphasize investments with a human face that include and reach out to the rural poor and a reorientation of subsidies toward such investments.

1. India should increase investments in rural infrastructure (including transport and information technology that connects villages) and agricultural R&D (leading to improved technologies for farmers). This is our most important suggestion. To ensure high returns on these investments, India will have to invest in institutions that make implementing agencies transparent and accountable to user groups. Part of this expansion of pro-poor investments in rural India should be financed by reducing food and input subsidies, making them available only to vulnerable groups.
2. India should reorient its social safety nets to create more employment in rural areas; help strengthen the human resource base through education, nutrition, and empowerment of women; and build physical infrastructure. In this context, schemes like the EGS of Maharashtra to build rural infrastructure and FFE, well tested in Bangladesh, are much more promising than the untargeted PDS. These social investments must also address the high prevalence of micronutrient deficiencies (especially of iron, vitamin A, and zinc) among the poor.
3. Water is going to be increasingly scarce. Investing large sums in new mega-irrigation schemes may not be the best course of action, but it is important to complete those in which a lot of money has already been invested. Overall, however, managing water use through institutional changes, such as water rights that are based on farmer groups and water-harvesting schemes in dry areas with local participation, are likely to be more rewarding. Price reforms in irrigation, and even power supplies for agriculture, can succeed only if accompanied by suitable institutional reforms.
4. Indian agriculture faces promising opportunities in the production and marketing of high-value livestock products, fruits and vegetables, and fishery. To exploit these opportunities, India must liberalize its marketing and trade policies to encourage vertical coordination between farms, firms, and forks (supermarkets); facilitate increased flow of rural credit, especially to smallholders, through, say, nonbanking financial intermediaries; and withdraw any special concessions in support of foodgrain policies.
5. Trade liberalization in agriculture has the potential to bring rich dividends to developing countries, including India. To realize this potential, India must work toward establishing and strengthening a rules-based multilateral trading system through WTO negotiations. In the event of major hurdles in WTO negotiations and a delay in reaching any substantive agreement, India should explore its second-best options of reaching bilateral or regional free trade agreements with major developing countries in the region and beyond. Furthermore, to exploit the full potential of trade liberalization, India should carry out "behind the border" reforms by streamlining its own domestic markets, institutions, and infrastructure.

Recommended Actions

- Promote pro-poor rural and agricultural development by increasing investments in rural infrastructure and agricultural research and development (R&D).
- Reorient social safety nets to create more employment in rural areas; help strengthen the human resource base through education, nutrition, and empowerment of women; and build physical infrastructure.
- Reform water management and institutions and design water pricing systems on the basis of water rights to cope with increasingly scarce water supplies for agriculture.
- Exploit new opportunities to participate in the production and marketing of high-value livestock products, fruits and vegetables, and fishery.
- Work toward establishing and strengthening a rules-based multilateral trading system through World Trade Organization (WTO) negotiations and explore second-best options for bilateral or regional free trade agreements with other major developing countries.

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Commercialisation of Microfinance in India

By **M.S. Sriram***

The paper looks at the growth and commercialization of microfinance in India. It starts out be looking at how the commercial microfinance has evolved internationally by discussing two specific examples and then moves on to examine the specifics cases of four large microfinance institutions in India. The basic argument of the paper is that most of the early microfinance in India happened through donor and philanthropic funds. These funds came in to not-for-profit organizations. However as the activities scaled up, it was imperative to move to a commercial format. The article examines the growth imperatives and the transformation processes. The paper then proceeds to look at the implications of the transformation process and its effect on the personal enrichment of the promoters of MFI as well as the governance implications. Basically it questions the moral and ethical fabric on which some to the large microfinance institutions are built. It ends by answering a set of questions that may emanate out of this discussion.

There has been a significant shift from the days when microfinance was being discussed as the next big innovation to address the poverty issues in India to being discussed in terms of the next big investment opportunity. The language of microfinance has undergone a fundamental change in the two decades of its evolution. As some of the large microfinance institutions [MFIs] ready themselves to hit the capital market with their unbelievable valuations and the promise of deliverance, it might be important to reflect on the origins of these MFIs, examine the process of their

transformation and discuss some basic structural issues that are plaguing the microfinance sector in general and large organizations in particular.

Unlike other developmental interventions of the past – be it joint forest management, natural resource management and marketing interventions that benefit the poor, microfinance caught the imagination of the NGO sector in a big way in the 1980s. While a large part of the 80s was spent in organizing groups, being focused on community owned and managed structures and integrating them with the banks, the impatience of the slowness of this process was showing. The global microcredit summit organized in Washington DC in 1997, widely attended by representatives of 137 countries and nearly 3,000 delegates was, in a way, a watershed event. This was an event that was used by Grameen Bank to showcase its work of the past two decades. Grameen and microfinance were clearly being acknowledged as an effective methodology to reach small loans to the poor. The high profile support from the then first lady Hilary Clinton and the Queen of Spain drew the attention of several interested parties.

That was the time that many of the current large MFIs were setting shop in India. While BASIX was incorporated in 1996 and started off as the largest private sector MFI, SML, Spandana were following suit with SKS being a distance away. BASIX had a regional rural bank type of product portfolio – trying to address the needs of the poor as well as the non poor. Share was clearly sold on the Grameen model, Spandana was agnostic and even tried both the self-help group and the Grameen model before settling for the latter. SKS made a very slow start. The commonality in all these organizations was that [except for BASIX] they were all registered as public societies with grant money and came with a developmental orientation. Their original expanded names – Society for Helping and Awakening the Rural poor through Education and Swayam Krushi Sangham are indications of the orientation of these organizations. They were focused on poverty and looking at interventions that would benefit the poor. However, once these organizations discovered the magic of microfinance and started to grow, the issues were different.

Move from Not-for-profits to for-profits: The imperatives

When we look at the past two decades of microfinance, we find three distinct waves of action. The first wave was when people who were working in the development sector discovered the methodology of reaching micro-loans to the poor through a methodology that was mastered by Grameen Bank. The wave 2 came in when the first generation organizations reached scale and sought methods to morph into for-profit commercial organizations. The wave 3 is when mainstream commercial institutions like L&T finance, Equitas and the private equity players started looking at microfinance as an interesting business.

The basic methodology being used in commercial microfinance in India was innovated by Grameen Bank and later improvised by several players. This methodology involved the following elements:

1. Identify the potential customer. This was to be done by using a poverty index, thereby ensuring that the customers had a great deal of homogeneity
2. Organise them into groups so that they could address the issue of information asymmetry and lack of collaterals by transferring what could be an individual liability into a group liability and hold the group morally responsible for repayment – through a process of public oath4.
3. Have standardized products, standardized operating systems and enforce discipline; ensure that the exceptions were dealt with severely.

This methodology meant that there was a great template that could be applied almost anywhere irrespective of local cultural issues or peculiarities. The amount was small enough not to threaten the existing vested interests, small enough to ensure that the basic fabric of the local economy does not undergo a drastic change and at the same time was appropriate enough for people to go through the process of group meetings. The magic formula worked and was geographically scalable.

For the first time people in the developmental sector were discovering a methodology where they could keep in touch with a large number of poor clients, scale rapidly, and actually count the direct impact of their work5. The counting could easily be done by number of clients reached, the portfolio quality, amount loaned and the magic 100 percent recovery statistic. This was a

magic formula discovered and by the time the Microfinance Institutions [MFI] spent three to four years in operations, they found that there were challenges in keeping pace with the growth opportunities. From 2002 onwards we found these MFIs talking a new language – the language of transformation.

Globally this poor client hitting the Wall street was being celebrated by the formation and listing of Bancosol in the early 1990s. However, that was not a methodology that the South Asian players took fancy to, because of the basic differences in the delivery mechanism. However by the time microfinance in India had reached the second wave – the wave of transformation, every model became relevant for examination, because the delivery and the growth was contextualized for this region, and we needed solutions for continuous access to funds to fuel the credit tread mill that was built.

In case of legal ownership and governance, Indian MFIs had to find their own solutions. It was not possible to follow the Grameen Bank pattern in terms of ownership, where the borrower members also have a stake in the capital of the bank. That was possible with Grameen because it was incorporated under a special act. In case of the Indian microfinance the first wave institutions did not find a legal framework under which they could involve the community in the ownership structure of a MFI.

We had in an earlier paper listed the imperatives for movement to a for-profit format for MFI and the challenges in "transformation" from not-for-profit to for-profit format These imperatives stemmed from size – that the MFIs were growing much bigger than they should in their original form of not-for-profit incorporation. This meant that it would be increasingly difficult for them to explain their form to the commercial world, while the developmental world would stop funding them after a stage, given that the operations were largely profitable. It was also increasingly difficult for them to maintain capital adequacy or attract commercial capital because profits could not be distributed in a not-for-profit format. Therefore there was a need for all these institutions to "transform" or move from a non-profit format to a for-profit format.

While the potential for looking at this business from bottom-of-the-pyramid paradigm existed even then, the idea was not proven and therefore people with commercial interests were not coming in. It was indeed difficult for BASIX which started as a commercial entity, but with

little capital, to explain to the investors that this was a business in which commercial capital could come in. Therefore it was imperative that the initial players in first wave were the ones who had limited personal means to run the business. At the same time, the donor community saw potential in market based solutions for helping the poor to gain access to financial services. Thus it was a good combination of a market waiting to be tapped, with the funding coming from softer sources. Clearly a market failure was being addressed through this mechanism.

However, once the methodology was established, and tested over a few years, and the experiment was scaling up, it was indeed difficult for the donor community to continue to be engaged in what could be seen as a rank commercial activity. It was also around this time that some of the investors [including from the silicon valley – Vinod Khosla, Michael and Susan Dell, Pierre Omidiyar among them who took active interest in the global microfinance space] started looking for investments which not only gave them returns, but also an enhanced image – as people who ploughed their riches into socially responsible businesses. The wave 1 institutions that had started in the not-for-profit paradigm were facing challenges of stepping up their operations from their existing framework to a for-profit framework. These challenges were not only at the conceptual level, but also at the operational level.

Logic of public-purpose institutions

Unlike the for-profits, the not-for-profit

organizations operate under a paradigm that can be classified as "public purpose" organizations. The essential difference is not necessarily in their operating methodology – for instance there might be little difference in the operating methodology of Grameen Bank of Bangladesh and SKS Microfinance in India, but there is a significant difference in what these organizations are. The organizations classified as "public purpose" are structured in a manner that there would be no residual claims – structured as dividends in 'for-profits' – on current income. Similarly there is also no scope for residual claims on the liquidation proceeds. For instance if a not-for-profit trust or a society liquidates and there are resources left after paying off all the liabilities, this residue cannot go to the promoters or any other persons identified as promoters or managers of the trust/society, but in turn has to go to another public purpose organization that persues similar activities or in the absence of such an institution, to the state. The spirit is that if the organization is working on the basis of donor money which is coming in for the larger social good such monies are coming in from the public at large – it could be taxpayer money or potential tax payer money [money that is exempt from taxes due the nature of donations to a cause]. It could even be money which philanthropists put into the public arena. These funds should be necessarily used for a larger public cause than for generating private profits or enrichment of individuals. Therefore such funds should remain in the public domain. The microfinance activities in wave 1, were all started in such "public purpose" space with significant donor money that came in. When microfinance scaled up and became commercially attractive for the mainstream market to address the access to formal microcredit, there no longer was a need for these institutions to continue making a point. Ideally it should have been declared that their mission was accomplished and therefore they should have moved on to other problems that needed to be solved in the society. However, with the experience and success it was too attractive for the players to give up this agenda, and thus the need to prove it at scale and take the success across the country and elsewhere was great.

Challenges and Issues of Moving from Public Purpose to Private Profits

Thus, we can see that there was a natural push for microfinance organizations to move into the commercial space. Unfortunately for the operators of microfinance, the move into the commercial space was not going to be simple. The options available in the commercial space to carry out microfinance activities were three:

1. Move the operations to a non-banking finance company [NBFC]
2. Move the operations to a co-operative format
3. Set up a local area bank

Each of these options had their own barriers from the perspective of the wave 1 microfinance organizations. Setting up of a local area bank [which BASIX did after much scrutiny and delays in obtaining a licence] was a painful and arduous route. The Reserve Bank was careful and miserly in granting licences for banks, its area of operations were to be restricted to three contiguous districts and the capitalization required was Rs.5 crores, a significantly steep hurdle for the players operating at that time. The regulations also prescribed divestment of the equity stake in a specific time frame and diversification of ownership, with cap on voting rights irrespective of investments. All these did not make the prospect attractive for anybody to pursue.

While several initiatives took off on the co-operative format, the design of co-operatives dictate it to be user-member based and therefore posed a challenge of continuously raising capital from the members, a much more difficult, slow and arduous route. This actually left the players with only one option of setting up of an NBFC. While BASIX had set up its operations in the for-profit space right from the beginning – through a complex structuring of softer loans obtained from patient investors like Ford Foundation and the Swiss Development Co-operation in a highly leveraged holding company and downstreamed as equity in an operating company, it was not possible for the others to replicate the model. Following a scam in the NBFC space in 1996-97, the Reserve Bank tightened the regulatory environment for NBFCs. The initial capital requirement for new NBFCs was set Rs.2 Crore and licence from RBI was made mandatory.

The wave 1 organisations that were operating under the not-for-profit format were ostensibly not in a position to bring in this capital through their personal resources to morph into wave 2

organisations. Most of the players at that time were from the developmental sector, who had discovered the magic of microfinance. There was a peculiar situation of having generated adequate business and profits within the non-profits, enough funds to promote an NBFC but a clear legal hurdle that these funds could not be invested in for-profit NBFCs because they were not public purpose organizations, but private profit generating organizations.

Internationally this was not much of a problem. In our discussion on BancoSol of Bolivia and Banco Compartamos of Mexico a little later, we shall discuss the specifics of the experiences in moving from non-profits to profits. In the Indian context the law – through the office of the charities commissioner – prohibited equity investments by not-for-profits. The logic followed the spirit of what public purpose organizations ought to do. The public purpose organizations were holding public funds in "trust" and such funds could not be invested in risky ventures irrespective of how proven the idea was, because the funds were infact meant for larger public good. Therefore the law provided that it is okay to park excess funds in approved safe securities [like government bonds, mutual funds and so on] so that they earn a return while they are waiting to be deployed, but not used as investments in commercial activities.

International Experiences in "Transformation"

While there are several examples internationally in organizations "transforming" from not for- profit paradigm to commercial institutions [See Rhyne, 20017 for a detailed discussion] we will discuss two celebrated stories as an illustration here.

Bancosol: BancoSolodario [BancoSol] of Bolivia was the first celebrated experiment that moved from starting off as a donor based not-for-profit entity to a full-fledged bank that celebrated the listing of its instruments on Wall Street. Its background was in a not-for-profit institution called Prodem. The Bolivian law permitted Prodem to take an equity position in the new entity and thus it was possible for Prodem to transfer its existing portfolio to the newly created entity

Given the legal framework of non-profit societies which were operating in the microfinance space, it was impossible to shift the portfolio without the new company providing consideration in cash

BancoSol in consideration of getting an equity position in the bank, while the new bank could also attract independent private parties to contribute to the equity. The route was clean where the not-for-profit took a direct equity position. Prodem continued to fund newer clients and transfer the stable clients to BancoSol. However over a period of time, there were tensions between Prodem and BancoSol on the orientation of the latter, with differences on excessive commercialization and Bancosol being accused of drifting away from small clients towards the larger ones. Over a period of time the ownership structure of Bancosol underwent a fundamental change with the original promoters fully moving out, Prodem reducing its stake in the bank and giving up its board seat. However there is no ready data available on "enrichment" of Prodem or any of the individual promoters.

The Indian Situation

When we look at the four large MFIs in India, we find the issues raised in the BC case resonating. Not only these issues come back to the fore, there are much larger ethical issues that we will have to discuss, not only from the underlying theory of understanding public purpose and private profits, but also from the apparently legal mechanisms used by the large MFIs. Given that these institutions are going to be hitting the market sooner than later, there would be a heightened public scrutiny of their practices and we will have to examine their conduct in greater detail. In the following sections we shall focus on issues pertaining to the nature and type of capital infusion into the industry and its implication on the governance standards and client relations. For the purposes of discussion we have chosen four of the largest MFIs in terms of gross loan portfolio in India.

Based on the MIX data, each of these four institutions serve more than 8,00,000 customers, have a loan portfolio of more than US$ 100 million and an asset size of more than US$ 170 million each by the year end 2009. These four MFIs chosen based on the MIX data are:

1. SKS Microfinance (SKS)
2. Spandana Spoorthy Financials Limited (Spandana),
3. Share Microfin Limited (SML)
4. Asmitha Microfin Limited

Of the four institutions listed above, three [exept Asmitha, which we shall discuss separately] have followed a similar path in terms of the original organizational structure, incorporation into a commercial format and the methodology of moving from a "charitable" construct to the "commercial construct." The issues arising out of such a movement and the path adopted by Spandana were discussed in detail in an earlier paper.

Unlike the international counterparts of BancoSol and BC the legal framework in India did not permit the NGOs to take an equity position in for-profit finance companies.

The promoters of each of these institutions possibly did not have the resources to meet the initial capitalization requirements of Rs.2 Crore to set up a for-profit finance company at that time. While this is not explicit, the nature of initial capitalization and the later movement gives enough reason to believe that personal resources were indeed a problem.

Given the legal framework of non-profit societies which were operating in the microfinance space, it was impossible to shift the portfolio without the new company providing consideration in cash. It was not possible for the newly formed company to acquire the portfolio of a public society in consideration of equity shares, which was the route that was adopted by the Latin American models.

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Winning Technique

By **Ashok Jainani**

After earning 500,000 pounds in a trading career spanning 10 years, Robbie Burns believes he has garnered ample expertise and investing wisdom to share with the public.

In this endeavour, he is assisted by the enticing cover and title of his latest book, How Anyone can make Money Trading Shares. Both these are effective lures for readers who are easily baffled by the stock markets.

Burns tried to help them earlier, when he published his first book, The Naked Trader, in 2005. Now, he wants to reveal his top 10 secrets, the 'sure-fire' ways to pick good stocks. Burns starts from scratch and takes the reader, simply and savvily, through the steps that are essential to become an investor or a day trader.

A journalist who left his job in 2001 to begin a career as a day trader, Burns claims to have made a profit every year, even during the market downturn. He puts this knowledge to good use and guides the reader through the intricacies of stock-picking in a witty manner.

Burns does not outline any new analytical tool and simply employs well-known concepts and tried-and-tested strategies of successful investors.

He points out how even a layman can utilise these to pick stocks that have the potential to earn profit. The book is brimming over with tips, from 'Things to Think about before Buying' to 'Top Ten Mistakes'.

Some of these, such as the 'Seven Sins', are provocative enough to catch the reader's attention instantly. Burns advises traders to avoid 'lust', that is, not to fall in love with their stocks. He says, "You're not dating shares-think of them as just acquaintances that can be dumped any time without worry."

However, some of the tips are repetitive. For instance, the first winning strategy is how to profit from a company's changing focus, while the fourth strategy is to focus on recovery plays, where the company restructures its products to adapt to the market demand. Aren't both, in a way, one and the same? In the second strategy, 'Find cheap shares', the author cites luck as a major factor in finding a cheap stock. However, relying on fate seems simplistic, especially as trading shares is a skill that needs to be honed. Such frivolous advice is hardly beneficial to readers.

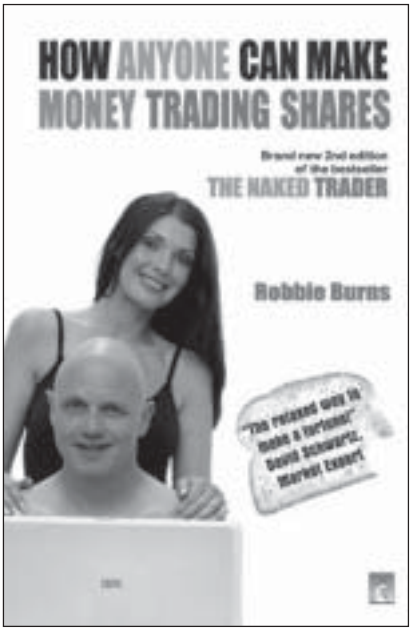
At times, the author contradicts himself. For instance, while explaining the concept of price to earnings (PE) ratio, Burns says that he "does not take an awful lot of notice of them". However, throughout the book, he cites his 'rule of thumb'- the market cap to profit ratio should be about 15 times. This is nothing but PE, the ratio in question.

In the third section of the book, Burns states that he strongly believes in charts. However, on the same page, he makes an assertion: "It's simply crazy to buy and sell shares on the basis of looking at a chart and nothing else at all."

Also, he has illustrated numerous examples, all of which are backed by charts. Burns has also completely ignored the fact that the stock markets do not function in isolation and that any action in a major country has repercussions in other parts of the world. The emerging markets have also become financially influential.

This makes the entire process of stockpicking and winning rather complicated. The language is simple and the text is not inundated with jargon. The concepts are explained in an easy manner with the help of charts and graphs. If you're a newbie, Burns' advice will help you learn how to zoom in on profitable stocks. However, contrary to the author's claims, it's not a 'sure-fire' guide to success.

If you want to become an active day trader, you will need to read more about the craft of stock-picking. Despite the failings, the book is racy and has an entertaining style, which can help the trading tyros get a foothold in the complex arena of stock markets and ensure that they make a profitable start.



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AGRI NEWS

India Harvests Record Grains, May Allow Exports

India's record grains output in 2011 may prompt the government to allow wheat exports, Farm Minister Sharad Pawar was reported as having said in a press conference at the capital. This statement boosted the prospect of overseas sales of the grain from the world's second - biggest producer.

According to news report, Junior Farm Minister Arun Yadav last month said the country could lift a four-year-old ban on the overseas sale of the grain.

Pawar, a key member of a panel of ministers headed by Finance Minister Pranab Mukherjee on food, has favoured overseas sale of farm products like sugar to keep funds flowing to mills to ensure timely payments to cane growers.

India's wheat harvest is seen at 84.3 million tonnes in 2011, higher than the previous forecast of 81.5 million tonnes and last year's output of 80.8 million tonnes.

"The government has to take a serious thought on storage, allocation to states and exports," Pawar said in the conference while releasing the latest food grain forecast for the current crop year to June.

India's food grain output is set to touch an all-time record of 235.88 million tonnes in 2010/11 helped by the highest-ever output of wheat and pulses, he said.

The latest production forecast is 1.6 percent higher than the previous year's 232.07 million tonnes. India's crop year runs from July to June.

Analysts said the higher grain output forecast would help the government to allow wheat exports at a time when the country's food inflation has eased.

In 2010/11, India's lentils production is likely to rise 18 percent to 17.3 million tonnes. India is a net importer of lentils and higher production would make the widely consumed nutritional cereals more affordable for the common man.

India's food inflation eased to 9.50 percent in the year to March 19, data released last Thursday showed, from 10.05 percent in the preceding week.

Bumper Rabi Harvest Brightens Export Prospects

Centre proposes to allow export of wheat and cotton as prospects of record harvests in the rabi season brighten, Agriculture Minister Sharad Pawar said on Wednesday.

According to news reports, Mr Pawar was beaming with the excellent rabi harvest. He said "Production of food grain is highest since 1947. The government has to give serious thought on storage, allocation and exports of food grains this year".

Agriculture ministry also released its third estimate of production levels for all major crops and projected record food grains output of 235.88 million tonnes, up by 8.14 percent. Wheat harvest in the country is projected at an all-time high since independence at 84.27 million tonnes while rice output at 80.38 million tonne.

"We have more stocks than buffer norms. Government must take a view on allowing exports," Mr Pawar was reported to have said. As on April 1, rice and wheat stocks in the country totalled 52 million tonnes, way ahead of the buffer norms for the period. While exports of wheat were banned by India in 2007, rice exports were banned the following year.

Quoting commission of agriculture cost and prices (CACP) estimates, Pawar said wheat stocks alone were valued at Rs 40,000 crore. "This is a valuable stock and proper usage has to be given a serious thought," he said.

The government has already allowed 5.5 million tonnes cotton export till January this year and lifted the export cap on 720 million tonnes yarn. The textile industry is already complaining of severe shortage in natural fibre. It had urged the government to prevent further exports in light of actual production being lower by up to four million tonnes.

A decision to announce bonus over and above a higher minimum support price for wheat this year is also likely to be decided at a ministerial panel meeting on Thursday. CACP is likely to announce Rs 50 bonus over and above wheat MSP of Rs 1,120 per quintal this year.

AGRI NEWS

Wheat Jumps on Estimated Exports

Wheat yesterday traded with the positive node and settled 1.8 percent up at 1174.8 on the heels of possibility of domestic wheat export permission by government.

As per official sources, government is expected to make a decision next month on lifting the export ban on wheat in light of strong domestic production in the current year along with hefty buffer stocks in government warehouses.

India's wheat harvest is seen at 84.3 million tonne in 2011, Agriculture Minister Sharad Pawar said.

In Delhi wheat prices dropped -10 rupee to end at 1225 rupees per 10 kg. In a recent trading session Wheat had touched the all time low of 1157.6 after opening at 1157.6, and finally settled at 1174.8.

Trading Ideas:

- Wheat trading range is 1145.5-1199.5.
- Wheat gained on the heels of possibility of domestic wheat export permission by government
- Wheat is having resistance at 1187.10 and support at 1160.10 level.
- India's wheat harvest is seen at 84.3 million tonne in 2011
- In Delhi wheat prices dropped 10 rupee to end at 1225 rupees per 10 kg.

Spinning Industry Body Pleads to Curb Cotton Exports

The Southern India Mills' Association (SIMA) has urged the Prime Minister of India not to allow any further export of raw cotton till January 2012.

In response to the media report that the Indian Agriculture Ministry has recommended to enhance the export quota of raw cotton by 1.5 million bales to reach a ceiling of 7 million bales (170 kg each) for this cotton season ending in September 2011, the chairman of SIMA, Mr. J. Thulasidharan on April 6th, has written to Mr. Manmohan Singh, the Prime Minister of India and the Cabinet Ministers of Finance, Commerce & Trade and Textiles urging them not to allow any further cotton exports from India.

In speaking to this scribe on April 6th from India Dr. K Selvaraju, Secretary General of SIMA told that the spinning industry will face a shortage of 2 million bales of cotton (170 kg each) during the tail end of this cotton season even with the current export limit. He added that the SIMA has urged the Indian government to curb further cotton exports due to the supply shortfall and the interest from the Indian Ministry of Agriculture to enhance the export ceiling limit.

In the letter to the Prime Minister, Mr. Thulasidharan has forecast the shortage of cotton from July of this season and insisted that there needs to be a closing stock of at least 5.5 million bales (170 kg each) for this season.

However, on February 25th, India's Cotton Advisory Board has estimated the closing stock for this season to be 2.75 million bales (170 kg each).

Mr. Thulasidharan has stated that allowing further export of cotton will result in the closure of large number of spinning mills between July and October. He has commented that any further cotton export will be disastrous for the spinning industry which is already suffering due to enormous inventory of cotton yarns and poor upstream demand.

A cotton procurement executive from a textile conglomerate who wants to remain anonymous said to this scribe that the enhancement of the export level may be a bonus for this year; but he feels this situation is highly unlikely as the cotton arrivals in India are in the last throw. Producers are likely to bring 5th or 6th picking to the market limiting the availability and the planting season in the State of Punjab is on the horizon. He ruled out that the export enhancement is merely a speculation at this juncture.

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Photographs of handicrafts training of SHGs under NAIP, Godda (Jharkhand)











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- Implementation of DFID funded Western Orissa Rural Livelihood Project (WORLP) – Watershed Development Mission, Govt. Of Orissa – 2005-2010
- Comprehensive Watershed Development Project in Karnataka - Watershed Development Department (WDD)-Government of Karnataka – 2006-07
- Madhya Pradesh Tribal Development Project - The International Fund for Agriculture Development (IFAD), Rome – 1997

Grass Roots level Livelihood Implementation

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

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

Organic Farming

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

Watershed Development

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

Panchayati Raj Institutions

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

The PRI division will also provide the following services:

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

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