

Alleviation of Poverty in Pakistan through Sustainable Agriculture - Some practical suggestions

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Agriculture is primary interface between human being and environments. It utilises more land, water and solar energy than any other human activity. It utilises more than 40% of total land of earth and more than 60% water. More than 40% of energy of sun falling on the ground is utilised by this sector. We have already over taxed nitrogen in the soil and therefore use more than 60% of nitrogen needed by crops from synthetic or manufactured fertilisers. In Pakistan available land per person is about 0.5 acres against 17.5 in USA. We cannot create more land and use more water without degrading land elsewhere in Pakistan. By withdrawing water from one area, we are losing more elsewhere in form of environmental degradation, erosion, sea encroachment, rise of salts from saline ground water previously kept in check by cultivation, destruction of pasture land and biodiversity. In Pakistan more than 75% water is utilised for agriculture and that again is used ineffectively or inefficiently.

Lining of Canals in Sindh.

We are told that canal and watercourse lining will stop seepage of water. At least for Sindh it is a myth and not truth. I purchased 100 acres of land adjoining embankment of Rohri canal 40 years back, put in a tube-well, only 160 feet from the mid stream. Water table was at 22 feet, and at Tando Jam 3 miles away in tube-well of the university it was at 20 feet but the latter place was at a contour of two feet below my tube-well showing that ground water at two places was exactly at same depth. In my official capacity I had put in 3000 tube-wells in Sindh some near the canals and others away and knew that no seepage takes place from the main canal. I also found that if I used silt free tube-well water, there was seepage from watercourse embankments, but not when I used canal water carrying fine particles, which are clayey in nature and seal spaces between silt particles, and stopping seepage. In the whole Indus plains there is hardpan or clay layer at depth of 0.7 to 1.2 meters and usually is 30-40 cms thick. It is used for making pottery, bricks and mud walls of houses. Where did it come from? It originated from finest particles brought by the Indus waters during Holocene (or the past 12000 years). In Sindh, there is no place 5x5 kilometres in area in the Indus plains forming about 40% of whole province, which has not been visited by the Indus during Holocene. This fine clayey matter passes through silt layer which is porous, due to pressure of irrigation or river flood water but surface water pressure is not enough to take it below 1.2 meters and it deposits there forming hardpan through which water does not pass easily. A watercourse 1.25 kilometres long and irrigating 500 acres has bottom occupying about 0.2 acres. Fine particles passing through the

watercourse in one year are equivalent to fine clay deposit entering the land in 2500 years and forming hard pan and thus hardpan is formed at bottom of canals and watercourses. In a few years it stops any seepage. In new canals seepage will take place for may be 5-10 years and then no more. The people and government are made to believe that seepage takes place from canals and watercourses. It does take place only in some areas of the Punjab, as the soil is made up of mixture silt and medium or fine sands, which allows water to penetrate. Seepage takes place from any land it-self when excess water is applied. Water table in my tube-well was at 22 feet for 10 years. Then after commissioning of Tarbela Dam more water was allowed in Rohri canal by about 60%. Farmers in all neighbouring lands used this excess water on same land and in five years water table rose to dangerous level of 6-7 feet below the ground. It was case of ineffective and inefficient use of water. It caused degradation of land by water logging and salinity, low yields, low productivity and deterioration of orchards by new pathogens and diseases, leading to poor productivity.

Unsustainable ground water use in Sindh.

Then there is case of unsustainable ground water use by pumping in excess of annual re-charge. In the Indus plains of irrigated area of Sindh, only 15% area has fresh ground water out side the riverain belt. This water has depth varying between 100 to 500 feet depth and below it is sea water of pre-Holocene era. On pumping, this saline water rises turning fresh water brackish and unfit for agriculture, animal husbandry and human use. The whole fresh water upto depth of 500 feet will turn saline after pumping for 20,000 to 40,000 hours of pumping. Already many tube-wells installed in 1960s and 70s in Sindh were turning saline, but due to recent drought, tube-wells were pumped round the clock by farmers since 1999 and many tube wells have turned saline, spoiling the land and now reclamation of it is costly and unsustainable.

Conversion of agriculture land into urban townships.

On one hand we are reclaiming marginal unproductive lands at cost of productive ones and on the other for rapid industrialisation and migration to urban areas for better life, we are removing most valuable land from production and it is not being stopped. Most Taluka Headquarters in Sindh were small towns of 5000 people at the time of independence but today have population of 100,000 each i.e., 20 times and expansion is in the fertile agricultural lands of many poor uninfluential farmers. It is obvious that costs of environment degradation are being borne primarily by the poor.

Unsustainable support price of wheat.

Helping the poor is fighting against poverty. There are many poor people in urban areas too, but farmers are poorer than urban poor. By any yard stick, from life expectancy at birth, level of consumption, access to education and health services or number of years of schooling completed, urban people have

invariably and always been better off than rural areas. It is no secret that small farmer subsidise the food and other requirements of urban poor as per policies introduced 50 years ago. The support price of agricultural commodities is a farce. It is suppression of prices. Recent support price of wheat at Rs.350 per 40 kgs was an increase of 16.66% over a period of four years since 1999, when it was fixed at Rs.300. This amounts to annual increase of 3.92%. Is this the annual rate of inflation? The general public thinks that it is at least 2% per month compounded. The Government may not accept it, but it will not be unreasonable to accept 10 to 12% inflation annually. The State Bank's figures may not be disputed and prices of wheat have to be fixed accordingly. Can any one question that in the past four years the prices of all farm inputs have not been increased? The inputs are seeds, fertilisers, pesticides, herbicides, tractor hourly charges, diesel oil prices, labour wages, transport cost, harvesting and packing charges etc. All have increased. This type of fixation of price of agricultural commodities is going to make farmer poorer and reduce inputs and yield.

Changing urban food requirements.

Today urban food requirement is gaining importance, a new phenomenon that depends considerably on horticulture. The development of horticulture is a unique issue, which can directly address poverty and food security in both rural and urban areas; in case of the former by employment of more persons and in case of urban areas more healthy food and life. In Pakistan we have not given any heed to growing horticultural crops. We have limited ourselves to field crops. It is little understood that horticulture can employ five times more people in rural areas than field crops and also more people in trades like transport, farm chemicals, marketing and export. Mexico has 13.2% of its area under horticulture. Each acre makes 5-7 times as much money as from conventional crops. There is strong urban bias that favours investment in urban centres at the expense of agriculture and rural communities. When we see a policy that appears to support rural development, it invariably benefits large land owners, rather than small holder farmers.

Land reclamation for agriculture versus biodiversity.

In general our planners do not realise that increasing land under cultivation has already been detrimental to retention of habitat and biodiversity and reclaiming desert lands is costly and uneconomical. We are destroying fauna and flora and risking species, before their full value to human kind is discovered.

High chemical inputs cause environmental degradation.

The high input farming makes optimum use of chemical and energy practised in industrialised countries, needing heavy capital outlay and vast areas. It is not applicable to small holder farms of developing countries. It causes environmental degradation and can be known from the statistics of heavy use of chemicals and energy in the past half century i.e., from 1950-2000, when nitrogen fertiliser

use has increased about 25 folds, phosphates 8 folds, potassium 4 folds and pesticides 50 folds. All these have created environmental pollution including high use of fossil fuel increasing carbon dioxide content of air and there by climatic change by warming the earth.

Can organic agriculture replace present cultural practices?

The organic agriculture has its own limits. It can be practised in Pakistan, but after use of fertilisers and chemicals for or the past 40 years, we cannot easily get away from the existing system. It does not involve any use of bio-technology, farm chemicals and high energy inputs. It is labour intensive, but is economic only if proper guidance and training is given. It is readily adaptable to field crops, but is difficult to adopt to horticultural crops, which need timely operation of high inputs; for example nitrogen comes from farm wastes and legumes grown and ploughed in, potassium from granite industry dust, phosphates by reducing pH of soil, as well as bone and fish meal and farm yard manure. Diseases are controlled by extracts of many plants and these are not readily obtainable, micro nutrients in form of natural metallic sulphates, chlorides which are permitted for spraying and not by ground application and yet all are slow to work and for many diseases there are no natural chemicals available. Farmers in developed countries get 10-25% premium on organic fruits and vegetables, but they are not as attractive to look as those produced with chemicals. In general these have limited market and sophisticated buyers. In developing countries they would be total failure unless owners are highly educated in that field, have well educated farm managers and trained labour, but yet the system has to leave room for occasional spraying with chemicals and use of urea by spraying a number of times to make it acceptable as organic product. Of course field crops are different, but no body is ready to pay higher prices for wheat, rice, corn, cotton and sugar-cane grown organically.

Precision farming versus organic farming.

The only choice left to us then is sustainable and precision farming, in which we apply the best science and management to small holdings on our farms. We have practised organic agriculture, but we cannot produce a good citrus crop without use of pesticides. We cannot control hoppers in mango without use of chemicals. We do have mango varieties immune to hoppers, powdery mildew and anthracnose, but then stem end rot and bacterial black spot take their toll. Aphids and scales cause sooty mould or blackening of leaves and fruit unless chemical or natural oils or sprayed, but there is limit to number of sprays of oils a year. Caustic soda controls powdery mildew, but not as effectively as pesticides.

Breeding for new horticultural crops.

Genetic improvements in rice and wheat have sustained large population in India and Pakistan since 1965. There is tremendous scope in producing new varieties of fruits, nuts and some industrial crops by breeding, but this is practised only in developing countries and underdeveloped countries are far behind even in

getting latest information leaving aside importing them. Looking to tremendous demand for horticultural products in developed countries, only the countries strong in horticulture can respond and catch markets. Horticultural corps can bring a new Green Revolution in developing countries if there is will.

Women as agriculture wage earners.

Women do work on family farm but women of daily wage earners or farmers in the rural Sindh and the Punjab are not allowed to work on other people's farms as paid labourers. In some tribes like; Bhil, Kolhi, Menghwar etc., women work as daily paid labour force, but not among Muslims. This attitude must be changed. Our own experience with hired women of above tribes has shown that where a worker has to squat and move carrying out operation like inter-cultivation, cutting grasses and in packing shed, operations, women out-perform males. This is unbelievable but is true as in women legs are placed at different angle with hip bone and therefore they can squat and work more efficiently without tiring out. Men can easily get tired in this position and in the long run, vertebrae, pelvic and knee bones get damaged as has been proved archaeologically over past nine thousand years of start of Neolithic Revolution. In case of small family farms house-hold women contribute more to agriculture, considering cutting down grasses and fodders from the farm for milch and meat animals, milking them, extracting butter from yoghurt and producing "Lassi" rich in vitamin-D and calcium.

Intellectual Property Rights and WTO.

There is issue of Intellectual Property Rights. In one workshop FAO specialist tried to get opinion from innocent and ignorant participants, at Karachi, that Intellectual Property Rights may be allowed. The participants in 1995 did not know what it meant and I explained to him, that peach originated in Iran reached Europe more than 2000 years ago and Spanish and Portuguese planted it first in south and then in north America. Other Europeans took it to USA and Canada. They cross bred it in the past and continue to this day. The original germplasmas belonged to Iran. Now who should have Intellectual Property Rights, USA scientists or Iran. In the same way more than 100 wild acquisitions of grapes from northern hills of Pakistan were taken to USA by Dr. Olmo and Dr. Ms. Thompson, some 10-12 ago. Now who should have Intellectual Property rights on grapes, University of California or Pakistan? The issue was dropped in above workshop at Karachi, but I knew he will get approval from groups in Peshawar, Islamabad, Lahore and Quetta and Government of Pakistan innocently will agree that it is beneficial. I firmly believe that no one should have Intellectual Property Rights on any biological materials, as they belong to all humanity. The very science that has done so much to provide food to developing countries is also increasing the divide between rich and poor and in the name of Intellectual Property Right. Four leading USA companies are increasing this disparity. Trade Related Aspects (TRA) of Intellectual Property Rights have not been properly addressed by WTO.

Horticulture as break through in alleviating poverty.

The demand for fruits, nuts, vegetables, ornamentals, medicinal plants, herbs and spices is growing fast world over than the other sectors of agriculture. Demand is much more in the developing countries as in developed countries and that market is open, but product is to have excellent quality, other wise prices are marginal. Horticultural crops contribute importantly to income, livelihoods and diversification and small holding and family enterprise fully suit it, but initiatives in developing countries are lacking.

In 2000 AD, USA spent US\$15 billions on flowers and plants and four times the amount spent in 1980. So one can see the scope. The same is the case in Europe, Australia, New Zealand and South Africa. Flowering plants are bred in USA, sent to Japan for tissue culture, at test tube level. Then they are sent to Taiwan to bring them to plantlet level and from there they are flown to Netherlands to raise them to maturity in green houses. All four countries specialise in each of four stages of development of flowers. Flower business of Holland accounts for 60% of World's total cut flowers and transaction worth US \$ 3 billions in year 2000. They make about 40,000 transactions a day and planes take off every day from Amsterdam for various capitals of the World. Green house space in Netherlands is 25,000 acres. These green houses, control, water, day light hours and its intensity, temperatures by heating or cooling and humidity. Flowers from these are shipped even to other end of the world in Sydney (Australia), a journey of 18 hours or to Japan.

Of all agriculture crops horticulture can pay 5-10 times the field crops per unit area or unit of water. Horticulture can be replicated as efficiently on large scale as on small scale. Horticulture is eco-friendly if practised with diligence and scientifically. In Pakistan we have to eliminate poverty, drudgery and unsound economy of agriculture production, increase income per acre, increase employment, produce healthy food, capture sophisticated markets and only horticulture can do it. It is time to rethink. For the guidance of farmers let me put that we have successfully introduced seventeen varieties of mango with harvest date from 15th April to 1st October, six new varieties of lychee, three of longan (pulp like lychee but sweeter than it), four of grape fruit, six of grapes, twelve of peaches, 2 of zizyphus jujube (Chinese ber) and six of pomegranate near Tando Jam in very hot climate of Sindh, all oriented towards export, but scale is small and unless many other farmers adopt it, export will be limited. We can have monopoly to fresh grapes, peaches and plum export as we in Sindh can produce them in months when there is no supply of these fruits world-over. We can have monopoly to lychee of Sindh in May, to longan in end July to grape fruit at end of August and to grapes in April and May. No other country is producing them. The only country having identical climate is Mexico, but they are not in competition with us as they cannot saturate US market..

European markets for Pakistan horticultural crops.

Europeans will not accept yellow skin mangoes. They want large sizes of 350-600 grams, red or purple skin, high pulp ratio to total weight, not extremely sweet, but juicy, no turpentine smell, small seed [6-8% of whole fruit], sugar 14-15% like Sindhri and unlike Chaunsa (20-22% sugar)], skin free of blemishes and long post-harvest life. We have to aim towards this export and produce such varieties. Besides mango, there is scope for export of table grapes, wine grapes, plums, peach, strawberry, pear, fig, pomegranate, apricot, pistachio, almond, pecan nut, raisins, cherry, avocado, orange, grape fruit, lime, lemon, guava, papaya, tamarind, zizyphus mauritiana and jujuba, tangerine, lychee, longan, cherimoya, atemoya, sapote and sapodilla (chikku) and melon etc. Among vegetables there is scope for tomato, cucumber, water melon, melon, squash, pepper, broccoli, lettuce, asparagus and egg fruit (brinjal). Among flowers, chrysanthemum leads roses gladiolus, carnation and lily. Of medicinal plants and ornamentals, basil leads sabila, pepper, chamormilla etc.

These are simply guide lines for those interested in eliminating poverty in Pakistan.