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Sustainable Development Goals: End poverty, Food Security and Healthy Lives through Human Resources and Managing Agriculture Productivity (A case of Pakistan)

Dr. Hamzo Khan Tagar

Senior Program Manager, School Development,
(WB) Sindh Education Reform Program (SERP) Karachi, Sindh, Pakistan

Alamdin Bullo

Additional Chief Secretary, Govt. Sindh, Karachi, Pakistan

Syed Roshan Shah

Staff Economist, Applied Economics Research Karachi Sindh, Pakistan

Syed Mir Muhammad Shah

Ph.D. Scholar, College of Business University, Utara, Malaysia

Abstract:

The year 2015, is a year in which countries will shape a new development agenda in United Nations Conference to be held at its headquarter in the next month September 2015, and nations will reach a global agreement of 17 points for the welfare of human beings. The first component of agenda of new post 2015 is to decrease poverty in its all forms everywhere; secondly to end hunger by achieving food security and improved nutrition and thirdly to ensure healthy lives and promote well being for all at all ages. As a strategy to overcome two problems poverty and food security the increase in agricultural production is the right answer and healthy life of the people is also indirectly associated with pure, cheap and timely food supply in market.

Pakistan at present is faced with a serious food crisis due to population explosion and under-developed state of agriculture like others developing economies. The overall population growth is more than two percent in urban and two to three percent in rural. The estimated population of Pakistan is 200 million and it will be doubled in 2050. The rapid increase in population needs increase in food supply which is only possible through increase in agricultural productivity at large. The study contributes significantly in the existing body of knowledge on this subject. The major issues have been summed up by examining it through in-depth analysis using both quantitative and qualitative approaches. The study concludes that supply of important inputs seed, fertilizer and pesticides is inadequate in bowing seasons, which harms per acre yield and needs dire attention of policy makers for the welfares of the growers to increase their income and to reduce the rate of ultra poverty and also for the food security of the rapid increasing population and spreading malnutrition related diseases in urban centers of the country.

Keywords: *food security, poverty, healthy lives population, policy, growth, development,*

1. Introduction

Agriculture of Pakistan contributes to national economic growth and development in four ways. These contributions show the relationship between agriculture and economic development. Agriculture provides food and fiber to population. It also provides fodder to the domestic animals. The supply of raw materials, used in manufacturing products, depends on agriculture and value added in agriculture products has been measured over 100 %. Only wheat, the simple food item of agriculture production, can be used for more than thirty-five different purposes. Thus the food and fiber is one of the contributions of the agriculture sector.

The developed agriculture requires newly developed high yield varieties of quality seed, proper and timely use of chemical fertilizer & pesticides with mechanized farming. Such a poor access to these modern inputs is mostly due to dependence on tradition /time barred methods of supply, institutional and non-institutional rural inadequate markets and agriculture extension services.

The adoption of alternative pest management strategies as followed by developed nations to produce environmental safe production for their growing demand in the world markets is also a pre-requisite for environmental betterment and sustainable development of the agricultural sector. The better infrastructure and marketing facilities will also increase the grower's performance, keeping them in

market and increase the opportunities of agricultural capital gains which is essential for continuous increase in reinvestment process for further development of the agriculture.

The following input issues like seed, chemical fertilizer, pesticides, are discussed below in this details separately for comprehensive analysis and concluded that they are interconnected with each other and their main objective is only to increase production or per acre yield which is about 6 times less in Sindh than developed farming of the world. On the other hand, better agricultural productivity will ensure food security of the nations. The increase in per acre yield and efficient markets access also reduce ultra poverty, bring greater changes in growers' capital gains, steady growth in the sector that accelerates development process and reduce poverty of the masses at large.

The above all efforts will also increase country exports and foreign exchange which is directly needed by emerging economies like Pakistan. This study is an attempt to evaluate major issues in the supply of input and also to suggest dynamic policy insights for improvement at one side and it will increase per acre yield and another but important side income of the growers and food supply in the local and international market to ensure food security and reduce poverty in the country.

2. Methodology

The qualitative approach of research has been used in this section, mainly depending on personal observations, interviews of specific groups and some kind of available primary and secondary data to make the study a unique policy document in all respects. The above mentioned objective cannot be achieved until and unless we evaluate three important inputs in detail from grower's point of view. The second quantitative strategy has been employed while sorting out major issues in the agricultural sector of Pakistan by using published data of various organizations, particularly Bureau of Statistics, Agricultural Census and Agriculture Statistics of Pakistan and discussed in details.

3. Discussions & Results

It is analyzed that average growth rate in agricultural sector from 1950 to date has remained de-stabilized and shows variation as from 1950 to 1964 4.4% from 1965 to 1969 5.1 and lowest 1.0 in the year of 1970 to 1975 as 4.5. (Ishrat Hussain, 1981, pp.267).

Despite the performance of Pakistan agriculture sector in the recent past, it has also been observed with great concern that over the last two decades, crises in the agricultural sector has been on the rise and have affected annual growth rate.

A number of times, negative agricultural growth rate was observed again like (-5.3) in 1992-93, (-2.5) in 2000-01 and (-0.1) in 2001-02, in major crops. The more fluctuation in growth rate is observed from 2009 to 2013 in major and minor crops of the country (See Economic Survey of Pakistan 2001, 2006, 2015 pp.2, 13, 23 and 25). Average rate of agriculture growth is also not stable from 2008 to 2014 as 3.5 to 2.9 and 0.2 only in 2009 as shown in table 1.

Above mentioned variation in growth affects development process in the sector and also destabilizes economic development of the region. "Agricultural performance in Pakistan remained subdued. Major factors underlying this slow performance include slow rate of technological innovation, limited adoption of progressive farming techniques, problems with quality, quantity and timeliness of input supply, limited investment in construction and maintenance of infrastructure; marketing and trade restrictions, pest and livestock disease problems, and limited amounts of credit for agricultural production processing and the lack of agriculture -specific financing" (Economic survey of Pakistan 2015, pp.23)

Year	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Agriculture	3.5	0.2	2.0	3.6	2.7	2.7	2.9
Crops	5.2	-4.2	1.0	3.2	1.5	3.2	1.0
Major crops	8.4	-3.7	1.5	7.9	0.2	8.0	0.3
Minors crops	0.5	-7.2	2.3	-7.5	5.6	-5.4	1.1

Table 1: Agriculture Growth in Pakistan from 2008-09 to 2014-15

Pakistan Government of (2014-15 pp.25) Economic Survey of Pakistan. Islamabad, Ministry of Finance & Economic Affairs Division

When we categorically conclude the reasons of fluctuation in agriculture growth as shown above in table 2, we found two main reasons which hampered it one natural calamities i.e. floods and droughts situation and second important is inadequate supply of inputs seed, pesticides and fertilizers. The improvements in supply of three inputs can increase production from 30 to 50 percent in short run and can be increased up to 5 times as same as in case of developed countries with adoption of long term development strategy.

3.1. Seed

It plays a unique role among the various agricultural inputs in the development of agriculture sector. If the seeds are healthy, they definitely produce the healthy crop and the level of yield will increase. The improvement and efficiency of all the inputs is largely dependent on the quality of the seed used. It has been analyzed with great concern in this study that the average crop yield per hectare is 3 to 6 times less than developed countries. The high yield varieties of wheat, rice, cotton and other crops have been introduced in Sindh since green revolution period; but on account of inadequate supply and increasing prices, lack of storage facilities have not produced the desired results for the grower. The majority of growers use expensive local poor quality seed due to shortage of healthy seed in peak seasons. This is what compels the growers to purchase quality seed on credit from local market retailers. Due to infected and unhealthy seeds available in the market, most of the farmers store their best quality seeds using local treatment of mixing up of

Neem tree leaves or adopt other simple local ways to save them from any damage caused by insects, which affect their germination. It is one of the oldest traditional methods of protecting their best quality seeds. It is already mentioned in this study that the availability of best quality seed in the local market is something like rare and it is an important obstacle that reduces the chances of significant increase in production at farm level.

The market, public agencies, commission agents and government departments are trying to provide best quality seed but they sell healthy seeds at very high rates and only to their favorite big land lords and other influential persons who are the real beneficiaries of the public and private institutions. As far as the quality seed demand concerned, the public sector hardly meets fifteen percent of wheat, five percent of cotton, twelve percent of maize in the region.

It is interesting to mention here that the institutional failure is out of control in Pakistan. As Seed Corporations failed to deliver, it was closed in early 2000, but reopened soon after widespread protests of growers. These agricultural supply organizations have also been closed due to official mismanagement and political ill-will. And thus the growers of Sindh roam here and there in search of good quality seeds; hence they completely rely on few multinational companies. Some fake companies are said to be doing same illicit business. In this respect, the growers have to face two big problems, initially the highest expenditure of cost increasing and finally low level of production.

The latest data of distribution of improved seeds in country shows that quantity of improved seeds was reduced more over the decade of 1990 but demand for it is increasing more rapidly and about twenty times higher than what is supplied but there is no organized seed industry to meet all requirements of the farmers during peak seasons. The cohesion and the coordination of the various segments of seed multiplication and distribution is also the necessity for sector transformation.

S. No	Name of Crop	Total Metric Tonnes
1	Wheat	375332
2	Cotton	28389
3	Paddy	38852
4	Maize	16626
5	Pulses	1215
6	Oilseed	3089
7	Fodders	5237
8	Vegetables	16693
9	Potatoes	18674
10	Total	504107

Table 2: Seed Supply in the Market

Pakistan Government of (2014-15 pp.33) Economic Survey of Pakistan. Islamabad, Ministry of Finance & Economic Affairs Division.

3.2. Fertilizer

The growth in fertilizer use in the region is one of the most important success stories in the field of agriculture. It is a single most important input what plays a pivotal role in boosting the yield and production of all types of crops and helps in achieving almost desired goals of growth and development in agriculture sector. That is why; fertilizer is of the importance as a variable of change in rural sector of the economy.

The fertilizer is an essential component of crop production because most of the land in Sindh is not rich in-organic matters. Therefore, the growers in Sindh need fertilizer to attain required production of the crop. Putting a dung and waste product of animals is an old story in entire world. No doubt, it is a cheap source of manure but it is now used for certain crops like vegetables and fruits; but it takes more time to collect and spread in the fields and does not help with production /crop yield this much.

The study draws a comparison in the use of fertilizer between Sindh /country and developed countries and finds that if we follow the required ratio, we may boost our per hectare yield due to potential of the region towards the development of the sector. The minimum rate of fertilizer i.e. 144 kg per hectare in Sindh has caused the lowest yield of crops compared with other countries of the world. The ratio is 3:1 against requirement of 2:1 for obtaining optimum yield. The increase in crop productivity is also easily possible by the use of balanced use of doses of appropriate fertilizer for increasing food demand of the country where food inflation is hovering over 10 percent.

It further compares and concludes that “consumption of fertilizer in the country is at the rate of 144 kg per hectare as compared to 599 kg in Netherlands, 467 kg in Germany, 431 kg in Japan, 405 kg in Egypt, 309 kg in France and 220 kg in Italy. The production of wheat in kg/ per hectare in the world is as follows, France 6390 Pakistan 2160. Rice yield in the world stands at 3571, Egypt 7659 and Pakistan 2369. Maize yield in the world is 3980, Romania 8487 and in Pakistan 1357. Seed cotton in the world is 1603, Egypt 2508 and in Pakistan 1629. Sugarcane yield in the world is 61591, Egypt 103,637 and Pakistan 46,025. Tobacco yield in the world is 1558, Japan 2807 and Pakistan 1724”. Dr Syed Manzoor (2006 pp.08).

The above mentioned evidence of data shows that this most important variable chemical fertilizer happens to be the largest single input in the province agriculture and because of lack of awareness of the farmers on the use of fertilizers effectively, billions of rupees are lost annually through improper applications that reduce increase per acre yield which is a pre requisite for growth and development in the sector.

Having explored a host of hurdles in this single variable, the study concludes that the use of chemical fertilizers available in market is not common and easy in the region. Due to dismal knowledge and improper guidance, the farmers do not know the use and dose of fertilizers. At times, higher dose is used which is beyond the requirement and a waste of money. There is a general complaint in respect of fertilizers that mostly fertilizers are not available in market at the time of dire need, their rates vary from time to time, less information regarding the usage is provided to the growers. Therefore, this type of information is not sufficient to fulfill the requirement. The fertilizer manufacturing companies and agencies and dealers must make necessary arrangements to raise awareness of the use of fertilizers among the growers. Furthermore, fake fertilizer manufacturing companies continue to sell their substandard products in the market at low rates unabated. These fake and low standard fertilizers render thousands of acres fertile land ineffective. These factories are said to be operating at secret locations in the country. It is observed with great concern that due to mismanagement of higher authorities, expired imported fertilizers are being sold throughout markets of which instead of providing fertility to the soil decrease fertility. Therefore, the growers are supposed to ensure a check on date of manufacturing and expiry.

3.2.1. Data on Use of Fertilizers, Manures and Insecticides in Pakistan

It's worth mentioning here that "Out of a total of 8.26 million farms in the country, 3.35 million farms (41 per cent) reported use of fertilizers only, while another 2.45 million farms (30 per cent) reported use of both fertilizers and manures. The use of manures only had been reported by 0.22 million (3 per cent) farms. The remaining 26 per cent farms had not reported use of fertilizers and or manures. The use of insecticides had been reported by 2.75 million farms, representing 33 per cent of the total farms in the country". (Agric-census 2010, pp31).

The detailed use of fertilizers, manures and insecticides in various provinces is given in the table 2. It paints a dark picture of fertilizers use and low percentage of fertilizers use also affects productivity of agriculture and low productivity declines rate of growth.

According data of Pakistan Agricultural census (2010, pp49), the use of fertilizer that 41% of fertilizer is used across the country. At provincial level, 60% of fertilizer is used in Sindh, 45% in Punjab, 7 % in KPK and only 4 % Baluchistan province.

This show also paints a dark picture of fertilizers use and low percentage of fertilizers use also affects productivity of agriculture and low productivity declines rate of growth.

	All Agricultural farms	Manures	Fertilizer	Insecticides
1	Pakistan	03	41	33
2	Sindh	01	60	37
3	Punjab	02	45	41
4	KPK	15	07	09
5	Baluchistan	20	04	10

Table 3: Use of Fertilizers, Manures and Insecticides

Source: Pakistan Agricultural Census 2010, pp.31, 49, (country report)

Agricultural Census Organization Statistics Division Govt. of Pakistan Islamabad.

3.3. Pesticides

The crop protection is one of the variables of interest in achieving agriculture production. It does not induce higher yield but without effective protection against the attack of pests and diseases, the beneficial outcome of other inputs may not be realized.

The word 'Pesticide' is the combination of two words pest and cide. Pest means the agent that causes any disturbance or abnormality in normal function and inflicts loss. Cide means to kill or to poison which is used for killing or controlling spread and the cause of disease. Plant protection measures play a very important role in the modernization of country's agriculture sector. Pests and diseases have always taken a heavy toll of agriculture production. Protection of plants from pests and diseases is essential to ensure beneficial effects of fertilizers and other inputs.

Plant protection is an expensive input but the returns are very high. A serious thought to adoption of plant protection measures is given when widespread attack of pests and diseases on crops is experienced and vitiating. Availability of necessary pesticides and equipment for plant protection measures is, therefore, considered very essential. According to a study of specific group in the field, it is concluded that the crop yield may be increased by 2 to 4 times if the proper pest management practices are followed. There is a need for the maintenance of an efficient crop protection service that covers the technical and economical aspects of plant protection.

3.3.1. Little Use of Pesticides

The major obstacles in the use of pesticides are as follows.

- i. Lack of education in rural areas, poverty of tenants and small growers.
- ii. Limited/dismal government financial support.
- iii. High rate of pesticides in peak seasons.
- iv. Lack of credibility of pesticide companies and substandard pesticides availability in the local markets.
- v. Propaganda of NGOs against the use of pesticides due to their hazards to biodiversity.

Above all are the common problems which reduce the use of pesticides. But this reduction also hampers the average yield and results in loss of money and time. It is hard to estimate this loss at this stage but the growers lose more than 300 hundred million annually. However, it is very difficult to present accurate estimate of the loss due to the diseases because it varies from year to year and region to region. In 2009, this loss was estimated at above 38 billion rupees only in the crop of cotton in the whole country as estimated by progressive farmers of central region.

3.3.2. Issue of Fake Quality Pesticides

The practice of protecting crops against pest and diseases in the past decade has increased nominally but fake quality pesticides also inflict a great loss on growers converting their large input amount absolutely into sunk cost. But it is a matter of serious concern that their outcome is decreased with high rate due to substandard pesticides. It is a common problem in Sindh that pesticide companies lose their credibility in supply of good quality pesticides. Local dealers adulterate cheap material like kerosene oil with quality pesticides making three bottles from one. It leads to great economic loss to growers of Sindh and the country and is seen as an obstacle in the development process.

The government of Pakistan promulgated the agricultural pesticide ordinance in 1971 and reviewed in decade of 2000 to curb the sale of substandard /fake / low quality pesticides. A fine of Rs. 5 lacs to Rs. 10 lacs or two to three years imprisonment was announced. But regrettably these laws are not implemented in letter and spirit and fail to produce the desired results due to rampant corruption in state machinery and lawlessness.

According to study on specific groups, two pesticide laboratories were setup in the Sindh in Hyderabad and Rohri to check the quality of pesticides. Within fifteen months from July 2012 to November 2013, fifty three samples of pesticides were found spurious.

4. Conclusion & Policy Recommendation

The analysis of seed sector performance provides sufficient evidences in this regard that high yielding varieties of wheat and rice tremendously increase output. Wheat production was increased from 8691 thousand metric tons in 1975-76 to 20156 thousand metric tons in 2001-02, and rice production was increased from 2617 thousand metric tons to 5020 thousand metric tons in the same years. However, it has concluded that the average crop yield per hectare is 3 to 6 times less than the developed countries. It indicates the potential to further increase in productivity growth which is essential to accelerate the development process with simple efforts if taken during sowing season by provision of good quality seed on the cheap at farm level.

To increase the crop production, small and medium farmers should be given due attention for the supply of improved seed in order to boost crop production throughout the country. The supply of good quality seed should be consumed through an effective organization of a scientifically based seed production system to incorporate standardization if all steps involving variety evaluation approval and release of variety, setting up of seed multiplication chain starting from pre basic seed and leading to the production of the basic and certified seed, seed processing, seed quality control, appropriate storage and setting up of distribution and marketing systems are taken into account.

The cohesion and the coordination of the various segments of seed multiplication and distribution is also the need of the hour. There is no organized seed industry to meet all requirements of the farmers. Hardly 15% to 20 % of wheat, up to 30% of cotton, and 12 % of maize is met by the public sector. These are important inputs for farming but inadequate supply in market, failure of provincial Seed Corporation in providing good quality seed add to the difficulties of the growers. The failure of these Seed Corporation and closure for some period left a vacuum in supply at institutional level. The policy makers need to reinvigorate provincial Seed Corporation that has important role to play in meeting growers requirements on modern international lines like those of technologically developed nation growers.

4.1. Fertilizer Prospects

The surge in fertilizer use in the region is one of the most important success stories in the field of agriculture. It is a single most important input that plays a pivotal role in boosting the yield and production of all types of crops and helps in achieving almost desired goals of the growth and development in agric-sector. That is why; fertilizer has overriding importance as variable of change in rural sector of the economy. The study draws a comparison between the use of fertilizer in country and developed countries and finds that if we follow the required ratio, we will find more products in per hector yield due to regions potential towards development of the sector. The minimum rate of fertilizer i.e. 144 kg per hectare in country has caused the lowest yield of crops compared with other countries of the developed world as used 400 to 500 kg per hectare. The ratio is 3:1 against requirement of 2:1 for obtaining optimum yield.

Apart from fertilizer, other problems include imbalanced use of fertilizer due to illiteracy of growers/farmers, inadequate fertilizer supply in peak seasons, availability of substandard & damaged fertilizer in the market & minimal fertilizer use of 41% affects growth & productivity of farm sector and reduces the income of growers. We do not have a well-developed scientific procedure for sharing advice to the farmers on the use of fertilizers in different ecological zones. Chemical fertilizers happen to be the largest single input in national agriculture and because of lack of knowledge of the farmers on the use of fertilizers effectively, hundreds billions of rupees are lost annually through improper application. Also small and medium farmers find it difficult to obtain credit for the purchase of fertilizers. In order to maximize the efficiency of the fertilizer, the time and the method of application and interaction with other inputs like water, land preparation, seed rate and weeding should be explored for the guidance of farmers. Fertilizer availability should be ensured specially in peak seasons. Fertilizer companies should share information with farmers for a balanced use of fertilizer & its

advantages. The damaged fertilizer production within the country and its import from abroad should be banned strictly. The increase in crop productivity for food security of the nation (200 million people) is also easily possible through the use of balanced use of doses of appropriate fertilizer for ever increasing food demand of the country with food inflation hovering over 12%. The 17% sales duty imposed by present régime on all agriculture inputs including fertilizer may be withdrawn immediately.

4.2. Pesticides & Their Alternatives

It has been concluded that increased use of pesticides and massive expansion is needed in agricultural production but use of pesticides is very limited. It is concluded that only 33% of cropped area is covered by plant protection measures. The obstacles in the use of pesticides include poverty of tenants and small growers, lack of education in rural areas, minimal government financial support, hike in pesticide prices in peak seasons, lack of credible pesticide companies and second quality pesticides availability of substandard pesticides in the local markets, propaganda of NGOs against the use of pesticides due to their hazards to biodiversity. But this practice reduces the average yield and results in loss of money and time.

It is hard to estimate the loss easily but roughly the growers incur net losses of more than 500 hundred million annually and these figures vary region to region. In 1998, this loss was estimated at 30 billion rupees in cotton alone in the country. In the pesticides only 33% of the cropped area covered & 67% remains on the mercy of nature. Little awareness about uses, rapid increase in prices and sale of substandard pesticides in the market also contribute to loss.

According to a study of specific group in the field, it was concluded that crop yield may be increased from 2% to 5% if the proper pest management practices are followed. Proper use of plant protection measures increases yield per hectare. Post harvest losses are very high due to inadequate harvesting equipment and lack of post harvest technology. There is a need for the maintenance of an efficient crop protection service that covers the technical and economical aspects of plant protection. It is very necessary to establish a new corporation in public sector that may provide three important inputs to growers i.e. seed, fertilizer and pesticides on the reasonable prices in the fields. The second quality pesticide availability in market should be discouraged by strict legal policies. Local Pesticide industries should be encouraged with specific use of local herbs. Government should cover whole cropping area in region during heavy pest attack period by Ariel spray. The prices of pesticide companies should be checked strictly.

4.2.1. Need to Adopt Alternative Pest Management Strategy

Keeping in view the above mentioned difficulties in use of pesticides and their adverse effects; there is a dire need to switch to alternative strategies like the ones adopted successfully in developed nations. Our growers may also follow suit to save their money, environment and certified produce for its growing demand, but policy makers continue to neglect the issue due to some mala-fied intentions or policy flaws. Illiteracy, unawareness and traditional farming continue to be an obstinate obstacle in the way of innovative agric -methods, and innovative alternatives and the growers.

Integrated pest management is a best alternative in this regard to create organic farms and other methods to reduce pest population so that they may cause less economic, sociological and ecological damage. Agricultural systems should also reduce their dependence on pesticides. Instead, they should switch to natural and organic fertilizers. Pest management system may also be carried out using biological, cultural and mechanical methods including mechanical tillage, crop rotation, residue recycling, water management, increasing beneficial insect population, and biodiversity promotion.

It causes less damage to the environment due to following reasons, not using pesticides and synthetic fertilizers eliminates the potential for damage to the environment from those sources; the absence of synthetic fertilizer forces, farmers to observe the soil conservation, ethic of maintaining and recycling soil nutrients on their lands, thus reducing the risk of pollution in the area surrounding their farms and emphasis is also placed on soil recovery in winter through the use of forage crop plants, winter grains and ground-cover plants, which improve soil condition and reduce the risk of erosion, degradation and compaction.

These innovative approaches are feasible in horticultural and urban environments and tested and recognized in technologically advanced countries due to growing demand of their product in the world and has also great future prospectus for developing world like Pakistan to produce less environmental hazards certified product in age of global competition. The alternative methods mentioned above may also help to protect rather than degrade the land and environment, a fact that should be considered by those who determine the profitability of ecological methods in natural resources relative to traditional methods.

The farmers of developed world like Canada, America and Europe currently use only the minimum quantities of pesticides necessary for agricultural production purposes and this situation is partly due to the fact that integrated pest management has become standard practice in the developed world and organic farming practices seems to have gained currency throughout world as far as certified agric- commodities are concerned. The progressive farmers have come to believe that more recent products are less harmful to the environment. But it is also a major obstacle here in Pakistan that progressive farmers come to a drop in the ocean.

Pakistan has several kinds of herbs and botanical that can be used for local environmental friendly pesticide manufacturing at lowest cost. In this sense, eminent agric- scientist, Late M.H.Panhwar developed the neem tree leaves local pesticides at lowest cost and has been widely recognized and appreciated among farming community. This pesticide should be promoted by government for further research and development in the sector to save foreign exchange and establish new industries. In this regard, The Agriculture University Faisalabad and Tando Jam and its affiliated research centers can play an important role.

It is also proposed that the Provincial /Federal government develop an organic agriculture policy for the transition from pesticide-dependent farming to organic farming in the light of developed nations' successful story in this regard. This policy should include

some tax incentives, an interim support program during the transition period, technical support for farmers, the development of post-secondary organic farming programs and enhanced funding for research and development for organic agriculture in Pakistan.

It also recommends that the federal government in co-operation with its provincial governments establish a national level alternatives-to-pesticides program and it be made available to the public through electronic/print media in local / regional languages with large scale incentives. The government should slash general sales tax (GST) on purchase inputs like, pesticides seed, fertilizers and other mechanical tools to deliver in the area of organic farming on the lines of developed countries with an increase in the volume of certified organic products destined for foreign markets to encourage farmers to eliminate pesticides and synthetic fertilizers and also to meet global challenges in this regard.

In addition to this, it is further recommended for developing skillful human resources and better management system for continuous improvements at country level. These skilled human resources may further keep on giving trainings to the small growers and farmers at all levels. By doing so, a management chain will be established for achieving total quality in agri products. Better management can bring prosperity for farmers, growers and ultimately prosperity for country at large.

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