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Understanding the Importance and Scope of Agricultural Education to the Society

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Abstract **- Economic growth and industrialization of a nation is inextricably linked to the continuous availability, access, diversity and modernization of its agriculture sector. Agriculture in fact plays a vital function in whole goals and endeavors to attain fiscal development. A lot of the present day's developed economies, initially struggled to make their agricultural sector stronger. The states at a priority basis supply monetary help to their farmers, researchers and scientists with plan to boost their agricultural inventions still further. Agricultural science is among the one of the best career options of a study and because of the lack of information and proper guidance, peoples usually under-estimate this field. Each and the every requirements and needs of creature including food, clothing and shelter are straightforwardly rewarded by agriculture. A continuous research work is involving in this field to provide the maximum necessities to ever-increasing population of the world. Essentially, the entire agricultural land expansion might be taken place in developing countries of the world. Consequently, the importance of agriculture to society impinges on our quality of life, food, nutrition, clothing and locality where peoples are living.**

Keywords **– Farming, Crop, Livestock, Economy, Monetary, Agricultural Education.**

I. INTRODUCTION

Agriculture is the science and art of cultivating the soil, producing crops and raising livestock that are directly or indirectly benefiting to humans. The term agriculture also includes the financing, processing, marketing and distribution of agricultural products, farm production supply and service industries, health, nutrition and food consumption the use and conservation of land and water resources, development and maintenance of recreational resources, and related economic, sociological, political, environmental and cultural characteristics of the food and fiber system which are the extremely basis of civilization. Agriculture is basically practiced for the purpose of producing food and other human needs such as shelter, clothing, medicines, tools, weapons, ornaments and for the foreseeable future many more items. It is the food eaten by men, the clothing wearing, the material of homes, the gardens in vicinity, and many of human traditions and values come from agricultural segment. It is likewise practiced as a business for human needs and economic gain based on systematized body of knowledge and requires skill. Agriculture is mainly composed of six specialized branches, which are:- Agronomy (deals with soil management and the growing of crops); Horticulture (deals with the cultivation of fruits, vegetables and ornamental crops); Plant Protection (relates to control of insect pests and diseases of plants); Agricultural Engineering (involves knowledge of farm machines and equipment, it also deals with developing new systems and practices to address problems facing agriculture); Agricultural Economics (deals with the business end of farming); and Animal Science (basically the breeding and caring of animal for specific purposes, such as for their meat, milk and fur). All of these are branches of agricultural sciences and this field offers a number of opportunities in one of the rapidly growing fields including Bio-technology and Food Technology.

Importance of agriculture to the Society

Agricultural segment plays an important role in the economic activities of a country. The materials needed and economic progresses coming from this sector are; food, for instance wheat, rice, corn, sugar cane crops, fruits and vegetables. Agricultural segment in addition supplies seafood for mineral and protein needs. Agricultural division offers raw resources desired to create other products, for example natural substances from fields, forests and seas may be prepared into a diverse range of handicraft products. This sector adds to the economic progress through exports to other countries. Agricultural stuffs are an imperative basis of income for the nation, and a government should principally focus on to export more of agricultural products to develop the trade capacity of the country in overseas. Agricultural sector provides employment to a large number of peoples in the countryside such as farming, raising livestock, fishing and mining that depend on agriculture for their livelihood.

A progressive agricultural division can maintain other sectors of the market such as trade, manufacturing and services to community by making availability of the unrefined materials needed. This is the reason that when a nation or state plans about the industrialization, it desires to enlarge and recover its agricultural sector and production. However, intensifying production only is not adequate to expand the agricultural segment. It should be kept in psyche that it formulates the extensive part of the peoples and populations of a country, which are probable clients of other goods and services. Together with the efforts to enlarge production, it is essential to progress conditions of peoples in order to build up their capability as customers. Through this a further energetic barter among productive sectors, is expected to take place and steps forward equally in rural and urban regions. Nearly large percentage of peoples lives in rural area where agriculture is the major supporter of livelihoods.

The sufficient provisions of fundamental requirements such as foodstuff, clothing and shelter, denote the quality

of human life. Agriculture sector supports the peoples to have the benefit of a higher quality of life and offers food, clothing, and shelter. It assists us to meet our requirements and the needs of millions of peoples in all the states. The consumers have a broad range of selection of agricultural products like grains, fruits, vegetables, nuts, milk and meat at the neighboring grocery store year-round. Agriculture endows with jobs for many peoples in comparison to any other industry in a state and out of every 100 peoples, approximately several work in agriculture sector. International trade through selling and buying of agricultural commodities by two or more nations is practiced. Goods sold to another country are exportable agricultural products, while imports include products bought from another nation.

Presently, the land of earth surface is administered for cropland and meadow, while the natural forests provide wood for basic goods and fundamental services to human development globally. Forestry that is the science of planting, caring and harvesting of trees, provides millions of hectares of forest land**.** Forestry goods are prepared into a lot of kinds of plywood, lumber, particle board, paper and veneer. These goods are utilized in numerous traditions, but the shelter being the mainly essential. Forestry products can be categorized by the types of trees grown and harvested. The two main types of trees are hardwood (deciduous trees shedding their leaves in the winter) and softwood (conifer trees that are evergreen and usually have cones and needles like leaves). Agricultural land also provides food and habitat for much of wildlife occupying various regions.

Scope *of Agriculture to the Society*

Agriculture is among one of the great fields and have a lot of scope in local and overseas countries. The agricultural science focuses on all aspects of agricultural research. It offers readers an opportunity to tap into the future of food and fiber improvement and production. The science reports advanced research results in plant, animal and soil sciences, sustainable farming systems, and food science. Most of the population living in certain villages is engaged in agriculture where farming is the dominant sector of wealth and contributes in a variety of ways like given below:-

Countrywide financial system of agricultural nations contributes more to the national income, whereas manufacturing segment contributes lesser share. It designates that more the advanced stage of development of agricultural nations, the greater is the share of agriculture in national earnings. The most of population of agricultural nations is employed, working and depending on agriculture and associated actions. Practically, the majority of the population living in rural areas receives its income from agriculture and other livelihoods linked to farming. Likewise, in urban locality, a great fraction of manpower is busy in employments depending on processing and marketing of farming materials.

Agriculture sector targets on food production and supplies food for feeding of the growing population of a country. As a result, the agriculture sector is capable to meet up approximately every requirements of its population with regards to food by developing rigorous plan to enhance foodstuff creation. The majority of the industries is relying on the raw inputs created by agriculture, thus agriculture is the key basis of raw products to other industries. The production of industries such as cotton textile, vegetable oils, sugar, juices and paper, is completely relying on agriculture for the provision of raw inputs. The small level industries such as ginning and pressing, power loom and hand loom, rice husking, apiculture, sericulture, fruits and vegetable processing, are too primarily agriculture based industries.
The agriculture contributes to the revenue generation to the state by direct agriculture taxation (including land revenue, surcharge on land revenue and agriculture income tax) and indirect tax (sale tax and custom duty) that farmers or customers pay on sale or purchase of agriculture commodities. Agriculture sector shares an imperative part in overseas business, thus generating precious amount of foreign exchange, which is needed for the fiscal development of a state. The products from large and small level agriculture industries constitute the main items of export through roads, rails and waterways outside the state to other countries generating valuable amount of foreign exchange.

Significance of Agricultural biotechnology to the Society

Everyone benefits from agricultural research and operations performed nationally and internationally. Biotechnology or genetic engineering has led to the means in developing new techniques to increase crop yields and farm productivity. In addition, scientists have gained more knowledge about chromosomes and deoxyribonucleic acid (DNA) markers through plant research. Research is less expensive and more rapid using plants rather than animals or peoples. The biotechnology industry is outstandingly infantile and it is not even more than some years of age. It is manipulating living systems (whether living cells or cell components) and organisms. The fact that living organisms have evolved such an enormous spectrum of biological capabilities means that by choosing appropriate organisms it is possible to obtain a wide variety of substances, many of which are useful to man as food, fuel and medicines. Biotechnology has already begun to change traditional industries such as food processing and fermentation. It has also given rise to the development of a whole new technology for industrial production of hormones, antibiotics and other chemicals, food and energy sources, and processing of waste materials [1].

Genes are the basic units of hereditary information. A gene is a segment of DNA that expresses a particular trait or contributes to a specific function. Genes determine everything from the color of human eyes to whether or not peoples are allergic to certain substances. The cloning of expressed genes and the polymerase chain reaction (PCR-DNA replication on a grander scale), and biotechnological breakthroughs might continue to play significant roles in science. Both technologies give to researchers the means to make more DNA, but they do so in different ways. In particular, cloning involves the synthesis of DNA from messenger ribonucleic acid (mRNA) using an enzyme

called reverse transcriptase. Although this method reverses the flow of genetic information as described by the central dogma, it effectively mimics the process by which RNA viruses flip the direction of transcription in their host cells, thereby causing these cells to manufacture viral DNA even though the viruses themselves contain only RNA. In contrast, the polymerase chain reaction does not involve the use of an initial mRNA template to manufacture DNA. Rather, PCR involves the synthesis of multiple copies of specific DNA fragments using an enzyme known as DNA polymerase. This method allows for the creation of literally billions of DNA molecules within a matter of hours, making it much more efficient than the cloning of expressed genes. However, cloning remains the go-to method for researchers when only the mRNA template (and not the DNA template) of a sequence of interest is available [2].

For thousands of years, humans have manipulated nature to grow the best crops and livestock. Agricultural biotechnology is a set of tools and disciplines meant to modify organisms for a particular purpose. That purpose can include anything from coaxing greater yields from food crops to building in a natural resistance to certain diseases. Though there are multiple ways to accomplish this goal, the method that tends to get the most attention from the public is genetic modification. Agricultural biotechnology lets scientists pick and choose which genes can be introduced to an organism. As it is learned more about which genes affect different aspects of an organism, one can take steps to manipulate that feature or function. One way to do this is to take genetic information from one organism and introduce it into another even if that organism belongs to a completely different species. For example, if it is found out that a particular bacterium has a resistance to a certain pesticide, those genes can be lifted so that these could be introduced into crops. Then a grower can use pesticides to wipe out pests such as insects and weed plants while the crops remain safe. But with cross breeding, all the genes of one type of organism cab be introduced to all the genes of the second organism. It is not precise and it can take generations of plants before farmers arrive at the desired result.

Worldwide, different insect pests have become a connected part of field crops. They significantly reduce yield and affect almost every aspect of the plants. For many years major challenge for scientists has been in developing the resistant varieties against pests in plants. Plant breeders have also been successful during the last century in producing a few insect resistant cultivars or lines of some potential crops through conventional breeding, but this again has utilized modest resources. However, this approach seems now inefficient due to a number of reasons and alternatively, genetic engineering for improving crop resistance against pest and disease is being actively followed now a day by the plant scientists, worldwide. New tools and genes have been developed for use in the genetic engineering of plants to introduce effective resistance to biotic stresses and to understand the mechanisms of resistance. Recent advances in genetic engineering, *Bacillus thuringiensis* (Bt) has resulted in successful control of many economically important pests in food crops. This approach can allow increases in both productivity and quality of plants in an environmentally friendly manner, thereby reducing the use and reliance on chemical control of pests [3].

Evolution of resistance in pests can reduce the effectiveness of insecticidal proteins from Bt produced by transgenic crops. The results of studies from five continents reported field monitoring data for resistance to Bt crops and empirical evaluation of factors affecting resistance or both. Although most pest populations remained susceptible, reduced efficacy of Bt crops caused by field-evolved, the resistance has been reported now for some populations of 5 of 13 major pest species examined, compared with resistant populations of only one pest species. Field outcomes support theoretical predictions that factors delaying resistance include recessive inheritance of resistance, low initial frequency of resistance alleles, abundant refuges of non-Bt host plants and two-toxin Bt crops deployed separately from one-toxin Bt crops. The results imply that proactive evaluation of the inheritance and initial frequency of resistance are useful for predicting the risk of resistance and improving strategies to sustain the effectiveness of Bt crops [4].

The Growers control pests that compete with their crops by sucking nutrients from plants. A number of options for minimizing the impact of pests on crop productivity are available to growers; one option is the application of pesticides. Virtually some crops have various degree of innate tolerance to some pests but not for others. This selective tolerance has been started to be used to control pests in field crops. Nowadays growers all over the world minimize the negative impact of pests by using tolerant crops, fruits and vegetables. Generally, the best approach to pest control is to use host plant resistance in integrated pest management practices. The most important principle of pest management is to enhance the survival and spread of resistant or tolerant crops. Biotechnology in the genomics era offers unique scope for further improvement in crop resistance to attain environmental friendly sustainable agriculture. Current gene evolution can provide wide scope for the application of biotechnology across ecosystems and crop barriers. Genetic engineering provides an efficient and precise breeding tool in which genes of interest have been incorporated in rice and have shown excellent performance in most cases [5]. More than the past decade, the progress has resulted in the expansion of high frequency, routine and reproducible genetic transformation protocols for crops. This technology has been applied to produce plants that survive numerous abiotic stresses, in addition to gain tolerance against various pests and diseases. Additionally, quality improving and increased nutritional value traits have also been introduced into plants. Most of these gains are not possible through conventional breeding technologies and knowledge gained from one crop can also be applied to improve other crops [6, 7].

New molecular improvisations such as inducible expression of transgene and selectable marker-free technology can help in producing superior transgenic

products. It is also a step towards alleviating public concerns relating to issues of transgenic technology and to gain regulatory approval. The completion of plant genome sequencing has opened up a plethora of opportunities, paving the way to integrate data from the large-scale projects to solve specific biological problems [8]. Amongst crop plants for genetic manipulation, small genome size, availability of entire genome sequence, enriched genetic map and relative ease of transformation are the most amenable. Modern progresses such as use of clean gene technology or matrix attachment regions would help to improve rice transformation. Successful field trials and bio-safety of transgenic rice have been reported. This would act as a catalyst for greater acceptance of genetically modified food crops. More recently, the use of modern biotechnology has led to new pesticide products that control a variety of pests. These biologically produced pesticides, use the inherent pest fighting abilities of many existing plants and microbes, and have qualities that differentiate them from those of conventional chemical pesticides [9, 10]. Farmers can produce more fruitful crops with built-in plant protection at a reduced cost and policymakers should look into the potential use of biotechnology.

Discussion in the classroom is generally considered to be a useful and productive method of teaching, which improves the assimilation and the retention of concepts and is characterized by educational objectives related to complex thinking processes. The observations have shown that in an integrated area of activity such as agriculture, the mode of application of principles could quite often be the source of lively discussions [11].

II. Conclusion

Agriculture, as a complex human activity that can be presented in the way to be able to satisfy basic human needs to contribute to the well being and the survival of the expanding and developing human population. As a science based human activity, agriculture may provide the educator with a unique combination of educational opportunities, in a context which is authentic and accessible to the pupil and to the teacher. Investments in national and international agricultural research should increase in the future. There is a continuous need for new technologies and techniques to be developed to keep pace with the growing demand for food (crops, livestock, fish and forest products) without price increases or deteriorating natural resources and environment. Investments in agricultural research will continue to be highly beneficial to society in solving problems of food insecurity and poverty. Research and technology generation are central to achieve the structural transformation of the agricultural sector. Various agricultural experiments and activities can be comparatively easily simulated or reproduced on a limited or large scale according to the possibilities and the policy of an organization. Everywhere, the potential advantages of the agricultural context should be cautiously considered by science educators.

References

[1] Henry, C. 2003. Biotechnology and Genetic Engineering Above: DNA sequencing. Enterprise of the Chemical Sciences. Analytical Chemistry, 67-70.

[2] Pray, L. 2008. The Biotechnology Revolution: PCR and the Use of Reverse Transcriptase to Clone Expressed Genes. Nature Education, 1 (1): 94.

[3] Valarmathi, R., Nandini, S. and Nandhakumar, M.R. 2012. Genetically Modified Crops: Insect Resistance. Biotechnology, 11: 119-126.

[4] Tabashnik, B.E., Thierry, B. and Yves, C. 2013. Insect Resistance To Bt Crops: Lessons From The First Billion Acres. Nature Biotechnology, 31: 510-521.

[5] Swapan, K.D. 2004. Rice Biotechnology: A Need for Developing Countries. Agbioforum, 7 (1 & 2): 31-35.

[6] Sarwar, M. and Hamza, A. 2013. Adoption of Integrated Pest Management Strategy in Rice (*Oryza sativa* L.). Rice Plus Magazine, 5 (9): 6-7.

[7] Sarwar, M. 2014. Implementation of Integrated Pest Management Tactics in Rice (*Oryza sativa* L.) for Controlling of Rice Stem Borers (Insecta: Lepidoptera). Rice Plus Magazine, 6 (1): 4-5.

[8] Bajaj, S. and Mohanty, A. 2005. Recent advances in rice biotechnology towards genetically superior transgenic rice. Plant Biotechnol. Journal, 3 (3): 275-307.

[9] Sarwar, M. and Sattar, M. 2013. Varietals Variability of Winter Rapes (*Brassica napus* L.) for Their Susceptibility to Green Aphid, *Myzus persicae* (Sulzer) (Homoptera: Aphididae). Pakistan Journal of Zoology, 45 (4): 883-888.

[10] Sarwar, M. 2014. The propensity of different larval stages of lacewing *Chrysoperla carnea* (Stephens) (Neuroptera: Chrysopidae) to control aphid *Myzus persicae* (Sulzer) (Homoptera: Aphididae) evaluated on Canola *Brassica napus* L. Songklanakarin Journal of Science and Technology, 36 (2): 143-148.

[11] Dreyfusi, A. 1987. The Potential Role of Agriculture in Science Teaching. Research in Rural Education, 4 (1): 23-27.

Author's Profile

Dr. Muhammad Sarwar
is a Principal Scientist in Nuclear Institute for Agriculture and Biology (NIAB), Faisalabad, Punjab, Pakistan. Specialized in the field of Entomology (Insects) and Acarology (Mites) and significantly contributed in the field of crop protection. Worked on vertebrate pests management especially controls of rodents in field crops and storage. Explored, hitherto the unexplored 36 species of stored grain & stored products mites, which were new additions to Acarology, by conducting extensive survey of different localities in Pakistan & Azad Kashmir. These species were belonging to 8 genera viz., *Forcellinia*, *Lackerbaueria*, *Acotyledon*, *Caloglyphus* and *Troupeauia* of family Acaridae; *Capronomoia*, *Histiostoma* and *Glyphanoetus* in family Histiostomatidae. Identification keys, taxonomical observations, differentiation remarks, comparison of characters, similarity matrices, Phenograms and Geographical maps of new species along with 48 alien species had been prepared. Conducted research work on Integrated Management of Cotton Leaf Curl Disease, Pest scouting, Pest monitoring and forecasting; planning, designing and layout of different research trials and data recording for integrated pest management on different crops, vegetables and orchards. Imparted training to the farmers and Field Staff, and provision of advisory services to the farmers regarding plant protection practices. Instructed training to the pesticide's dealers for proper handling, distribution and storing of pesticides, their legal aspects and sampling of pesticides for the purpose of quality control. Involved in the research Projects, viz., Studies on the ecology, behavior and control of rice stem borers, Insect pests management of Brassica crops, Ecology and control of gram pod borers, and Management of post harvest food losses. At present, conducting research work on IPM of Mosquitoes, Cotton insect pests and Fruit flies.