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REVIEW ARTICLE

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A Feasibility Study of Precision Farming In Haryana

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1. INTRODUCTION

In Haryana agriculture is a way of life. Presently, agriculture sector is facing a crisis. Due to rising costs, falling prices, decreasing share in net state domestic product, stagnant productivity level, disguised unemployment and even low income elasticity of demand for farm products. These problems are the result of decreasing public and private investment in irrigation facilities, research and development technology, poor linkages with industry, ineffectiveness of policies in providing credit, disintegration of market and procurement system, WTO agreement regarding subsidies and market taxes. Due to all these problems agriculture as the occupation is increasingly becoming unviable risky and unattractive business.

In last one decade, around 30,000 farmer have committed suicide in different state of the country. It seems that farmer finds himself trapped to continue their profession. They are not able to get an exit from agriculture. So they decide to exit from the life itself.

The present study attempts to provide a viable option to the farmers which will attracts capital, technology, and link up with modern markets generating employment and safe and healthy returns with more prudent and precise use of inputs such as electricity, water, chemicals, knowledge technology and labor services.

2. OBJECTIVES

The present study is mainly descriptive and exploratory in nature as no research has been conducted in evaluating precision farming earlier. Therefore, following objectives have been set for the studies considering the constraint of the time and requirement of the course:-

1. To review the state of agriculture in Haryana in general.

2. To give a brief account of physical and market conditions. Present in Haryana economy favorable for precision farming in general.

3. To conduct the financial feasibility study of cultivation of crops under protected conditions, as a special case of precision farming in particular.

4. To analyze the possible impact on investment in cultivation of crops under protected conditions on gross state domestic product with simulation forecasting technique.

3. SCOPE AND LIMITATIONS

It has been mentioned earlier that the present study is only exploratory in nature. Therefore, its scope is limited only to understand the symptoms and signals which can be helpful in promoting the precision farming. Since, no past data is available. So, analytical study having cause and effect relationships is not feasible. The present study is only a futuristic analysis based upon certain assumptions and attempt has been made to keep the assumptions close to real conditions.

4. REVIEW OF THE STATE OF AGRICULTURE IN HARYANA

India is an agrarian economy. Agriculture is the country's largest private sector activity. Close to 60% of the population (nearly 60 crore people) depend on agriculture and related activities for their livelihood. The country is blessed with several natural endowments including varied agro-climatic conditions. From the snow-clad Himalayas in the north to the sun-soked southern tip, and from the arid lands of the west to the hill terrain of the east, India has varied seasons, soil conditions, temperatures and rainfall pattern.

To over 6,000 km of the coast in the peninsular region, there is a vast hinterland (Indo-Gangetic plains). The country enjoys of 880 mm a year (with regional variations) and sunshine for over 250 days a year. A large population (now 110 crore and growing at 1.8% a year) provides the requisite labour force. With all the natural endowments or factors of production land,labour, water and sunshine and, importantly, biodiversity the country ought to be a force to reckon with in global agriculture; but in reality

it is not. At over 600 million tones, India is the world's third largest producer of food. Yet, the actual output is far below the potential. Most of these facts are true about Haryana.

Already, the per capita availability of food is rather low in India as well as in Haryana; and there is now creeping fear of declining food availability. Agricultural growth has stagnated for long. For the last ten years, (representing the ninth and tenth plan periods 1997-2002 and 2002-2007) farm growth averaged a modest 2.3% per annum. Meanwhile, demand has been rising relentlessly, driven by rising incomes and demographic pressure. Both the country and Haryana agricultural economy faces a series of internal and external challenges. As it employs people in large numbers, farming ensures growth with equity. So, it may not be an exaggeration to state that if agriculture survives, India survives.

The gross area under various crops is about 165 million hectares. Apporoximately, 40% of land is under rainfed cultivation, the quantum and distribution of rainfall determines the size of the harvest. There are two seasons in which planting and harvesting take place. Kharif season is when planting takes place in May/June/July and harvest in September/October. Major Kharif crops are rice (paddy), coarse cereals, pulses, oilseeds (mainly groundnut,soyabean), sugarcane, cotton and jute/mesta. For rabi season, planting takes place in October/November and harvest in March/April/May. Major crops of the season are wheat,rice, pulses and oilseeds (rapeseed/mustard,groundnut).

Some of the salient features of Haryana agriculture include fragmented landholding; rainfed cultivation (irrigated farming is about 40%); low level of inputs usage (seeds, fertilizers, farm credit); antiquate agromomic practices; poor pre and post-harvest technology adoption; inadequate marketing infrastructure; low yields and often, unrealistic prices; and trady folw of price and market information to primary producers.

5. Farming in India is unlike that in developed economies such as the US and the European Union where farm size of 200 hectares is considered modest. Large farms measure several thousand hectares. The size brings to growers 'economies of scale'. Mechanization helps reduce costs. Use of technology is another advantage. Cultivation of crops largely under rainfall conditions is another salient feature of Indian agriculture. According to latest government statistics, just about 33% of total agricultural land is irrigated. In other words, a mojor part of agricultural operations is still dependent on rainfall. Spatial and temporal distribution of rainfall is critical for the success of rain fed agriculture.

Since 1988, the Indian meteorological department has been coming out with forecasts for the south-west monsoon (June to September). However, this forecast is confined to aggregate rainfall during the four month rainy season and hence of limited practical utility. Month-wise and rigion-wise forecast would help farmers plan their operations better.

Limited irrigation facilities should partly explain the existing low and uncertain yields in many crops. Water is the most critical input for agriculture. There is enough research evidence that scientific water management alone leads to higher crop yields. Despite rainfall in the range of 800-900 mm a year across the country, there are regions that regularly suffer water shortage. Southern areas of Haryana like Mahendergardh,rewari,Hissar, Rohtak etc. are also suffered from water shortage. Water conservation measures are conspicuous by their absence even as the precious natural resource and farm input us either wasted or not harnessed to advantage. Water use efficiency can be enhanced through measures such as micro irrigation.

Irregation is one of the six components for development of rural infrastructure under Bharat Nirman. The irrigation component of Bharat Nirman aims to create an irrigation potential of 10 million hectares by 2008-09 mainly through completion of ongoing major and medium irrigation projects. Experts have warned of a serious water shortage that may overtake India in the next few years. Agriculture, in general, wil face the challenge of overcoming the problem of water shortage or moisture stress. Crops such as sugarcane and paddy that guzzle large quantities of water may be the worst hit. There are large numbers of small and medium irrigation projects that await completion. Many are what are called 'last mile' projects that have suffered cost and time over runs and need some additional funding for completion. A new dimension has now been added to the threat of water shortage in the form of global warming and climate change. Experts predict a steady rise in global temperatures and frequent occuranece if floods and drought. Although climate change is a long term phenomenon, its effect would be continually creeping imperceptibly. An agrarian economy such as ours shoud do all that it takes to 'drought-proof' itself soon.

6. AN INTRODUCTION TO PRECISION FARMING

6.0 Introduction

Precision farming procides a new solution using a system approach for today's agricultural issues such as the need to balance productivity with environmental concerns. It is based ob advanced information technology. It includes des ctibing and modeling variation in soils and plant species, and integrating agricultural practices to meet site specific requirements. It aims at increased economic returns,

as well as at reducing the energy input and the environmental impact of agriculture.

Precision farming technology can cover a huge scale of farm land by the support of using satellite. Garm fielld considered is divided into many small meshes and the various data for each mesh such as soil fertility, moisture content, yield, and etc. are measured, collected and installed as the database in geographical information system (GIS). Global positioning systen (GPS) is also used to identity the exact location of both machines and farm field for giving the suitable treatment and operation to meet the condition obtained as the database in geographical information systen (GIS). As the various kinds of operation can be given based on the data obtained from the measurement, more precise control and necessary treatments such as fertilizer, herbicide and pesticide applications are applied timely to an each area of mesh accurately with suitable amount. This farming method leads not only to the saving of material resources and energy in operation, but also to the contr5ol to jeopardize the environment.

6.1 What Is Precision Farming?

The term "percision farming" offers the promise of increasing productivity, while decreasing production costs and minimizing the environmental impact of farming.

The term "precision farming" or "precision agriculture" is capturing the imagination of many people concerned with the production of food, feed, and fiber. It offers the promise of increasing productivity, while decreasing production costs and minimizing the environmental impact of farming.

Precision agriculture concept is spreading rapidly in developed countries as a tool to fight the challenge of agricultural sustainability. From centuries Indian farms are experiencing some sort of soft precision agriculture techbology. But to meet the huge food grain requirement of 480 million tones (mt) by the year 2050, with nthe increasing challenge of biotic and abiotic stresses experienced by crops,introduction and adoption of modern technology in Indian agriculture is inevitable.

Precision farming bedcomes more and more and accepted way of crop production and helps to achieve a sustainable environmental frindly agriculture. The objectives of site-specific farming are increasing yields, together with decreasing envirfonmental impacts. Furthermore, growing interest in automated data acquisition and information processing is going to form another milestone towards improved farm management and an overall trace ability in agricultural food production. The benefit and effectiveness of using precision farming techniques is highly dependent on the capabilities of the utilized technology.

7 FEASIBILITY OF CULTIVATION UNDER PROTECTED CONDITIONS

7.0 Technical Feasibility

Haryana is located on north-western side of the Indian union adjoinging Delhi. The state extends from 27'3 to 31'9 north latitude and 74'5 to 77'6 east longitude. So there having high temperature and low humidity from April to Jund months, high temperature and high humidity from July to September months and low temperature and low humidity from December to February months. So the green house can be cooled during the hot and dry seasons by evaporative cooling using fan and pad. For hot and humid season when evaporatively cooling does not function, the cooling can be done by installing a shade net over the green house and sprinkling of water on the shade net. The cooling by earth turned during summer and heating during winter can also be practiced.

The green house can be converted to naturally ventilated green house by opening the side ventilation by rolling the side flaps. The green house for southern peninsula and coastal regions shall only be naturally ventilated. The spots in the green house have to be avoided by proper design and orientation in relation to wind direction and speed. The size of the green house and the ventilation system are also to be designed properly to maintain optimum temperature and relative humidity. The construction of green house about one meter below the ground or providing the northwall and other devices to store the solar energy may be useful in Himalayan regions during winter. These green houses are also to be provided with double cladding film to maintain temperature at night. The functional and economical designs of green house for cultivation of flowers for exports and cultivation of vegetables during off season in all the regions have been discussed.

7.1 Planning Of Green House

The green house and service facilities are to be properly designed and located at site. The service facilities are to be properly connected to the green house and the space for future expansion of the green house is to be provided. The site should be level and properly drained and soil and water should be suitable for crop and available in plenty. Sunlight should be available in plenty and natural wind breaks should be available. Labour skilled and unskilled should be available nearby. The greenhouse has to be easily accessible to the market of the produce.

8. CONCLUSIONS

Green house farm are based on the principal that incoming infra-red rays are of short wave length which can enter a glass or other transparent material easily but after feflecting from the surface inside, the rays become of longer wave length which have less energy, so they cannot get out of the glass house or poly house. The heat energy thus get trapped inside the glass or poly horse increasing its temperature substantially. In the cold regions it was not possible in obtain crops of vegetables or folwers all the year round but the green house farming has made it reality. Now the hilly areas of India are also using this technology for the production of vegetables and folwers. This technology has now reached the most areas of the globe.

The importance of flowers in improving in economy through exports was realized in 1976 when the national commission on agriculture (NCA)came in the conclusion that floriculture could be expanded and made lucrative. Taking this finding as our basis I embarked on the study of floriculture in green house farms in Haryana. In order to produce quality flowers, the growers have started cultivating flowers especially the Roses in green houses. Gerbera is also a cut flower which has good demand both in the domestic and international markets. Gerberas, especially the exotic hybrids, have to be cultivated in a protected atmosphere so as to get good quality folwers. I hove also undertaken the study of Cornasum and Lillium flowers in addition to that of Roses abd Gerberas. I have taken the help of study conducted by the Indian institute of Horticultural Research (IIHR) Bangalore, for my research according to that researfch the yields of flowers were more in the Naturally Ventilated Poly Houses (NVPH) as compared to the Fan and Pad Cooling System (FPPH).

Variability description, variable rate technology and decision suppot systems are the key technologies for precision farming. Precision farming on a regional level is one way to apply this approach to small farm agriculture, but may also promote the development of rural areas. Precision farming provides farmers with a tool to apply fertilizer according to the need of a particular sub field. The savings made with this variable can be fairly large. This technology is certainly exciting and is bound to change the face if agriculture in the near future.

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