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DETERMINANTS OF AGRICULTURAL PRODUCTIVITY OF AVADH REGION IN UTTAR PRADESH

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ABSTRACT

There are various factors which are affecting the productivity which ultimately resulted in increase and in decrease of quality and quantity of the product. Although the productivity is not the absolute measure of Land quality but it reflects the ratio of input and output of production. A field which produces twice as compare to the previous year, is doesn't meant its productivity increases twice if former spent twice as compare to the previous year. So, there are various factors which affected the productivity of the field.

This paper studies about the determinants of Agricultural Productivity of Avadh Region in Uttar Pradesh which includes weather, Land Area, Availability of Tools, The supply and demand of the Market, Soil, Minerals, and Artificial Fertilizers, Availability of Labour and its skill, Availability of Infrastructure like water, electricity, road, availability of agricultural related markets like Mandis, Kissan Bazaar, e-chaupal.

Key Words: Agriculture, Agricultural Productivity, Determinants of Agricultural Productivity, Uttar Pradesh.

Determinants of Agricultural Productivity of Avadh Region in Uttar Pradesh

Increasing out-put per hectare of lands in the main problem which is attracting the attention of most of today. Land for agricultural purpose is limited while the population is increasing at the fast rate; it is, therefore, the major concern of the agricultural to fight against the odds provided by some factors of agricultural productivity. It is a well known fact the agricultural productivity is influenced by a number of complex factors. The main sets of factors are physical, technological and institutional. Among these sets of factors the climate and soil is the chief constituents of the environmental or physical factors. The technological factors relate to improved seeds, manures, fertilizers, irrigation, facilities, implementation of modern technology, insecticides and pesticides and other farming practices. As for as the institutional factors are concerned the size of holding, nature of ownership and type of tenancy may be cited. According to D. Stamp, "The crop productivity per unit area depends partly on the nature factors of soil and climate and partly on the management and organization of farmers[1]".

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The regional variation on the crop productivity is very much influenced by variation in climatic condition. According to prof. Shafi, "The natural advantage of soil and climate, however, influence to a signification degree the overall production of crops and show a direct bearing on agricultural efficiency"[2] . While measuring crop productivity, therefore, climatic constituents and soil should be taken into consideration. These factors produce major change in the average as well as with crop productivity.

In 1931, Dr. Walindir Koppen of the University of Grass, (Berlin) in his book "Grondrisis der Klimakunde" devised a classification of world climates. Koppen recognized that the effectiveness of precipitation in the development and growth of plant depended not only upon the amount of precipitation but also upon the intensity of evaporation which causes large losses of water from soil and plant. That part of rainfall which is evaporated is of no value in the vegetation growth.

Rainfall is the integral to the crop productivity. Rainfall provides moisture to the crops and grass lands through soil. The most frequent cause of infertility or defective productivity is an unsatisfactory moisture-air status in the soil. This means that either theirs is deficiency of moisture or deficiency of air in the soil. Excessive moisture is not a harmful factor. However deficiency of air, which is caused due to the fact that pore spaces of soil are completely filled with water and thus the air is completely excluded, leads to ill-growth of plants.

It is obvious that for the satisfactory growth of crops, abundant moisture is necessary. The study of soil moisture is of great importance. It is essential to consider how soil and how the rain or irrigation water received by the soil is disposed [3].

All the plants need output temperature for their growth. With high temperatures through-out the year, the plant growth will be luxuriant and there will be no resting period imposed by climate, if the rainfall is abundant and its distribution is favorable. The diurnal range of temperature affects the crop system, crop yields and crop quality annual range of temperature produces differences in the crops. For example, winter wheat never grows it the winter temperature is very low.

Light and sun shine are also very essential for the growth of plant and process of forming carbohydrate which makes up a large proportion of their bodies being initiated by the intake of energy contained in light from the sun. Sunshine is desirable for repaid growth and ripening of crops.

The most important factor affecting the productivity is soil, a gift from the nature to man, is the natural medium for plant growth. It is necessary to manage the land in a manner so that maximum production from the soil can be raised. The main function of the soil from agricultural point of view is to give mechanical support to plants and to store and supply the required

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nutrients and water for plant growth. Only the proper physical and biological condition can per these functions.

SOIL

Soil is derived from rocks. The weathering processes are responsible to produce soil. Soil is composed of four major constituents. They are inorganic particles, organic material, water and air[4.]

A good soil must be freely drained but must be of such a texture that adequate moisture for plant growth is retained in the soil. The fertility or productivity of a soil is more dependent on satisfactory water condition than on the natural content of plants foods. The fertility of the soil also depends on the chemical composition of the soil.

The essential elements of plant growth are carbon, hydrogen and oxygen which are derived from air and water while phosphorous, potassium, sulphur, calcium, iron, magnesium, boron, manganese, copper, zinc, molybdenum and chlorine are detained from the soil. Nitrogen comes from both soil and air. Nitrogen, phosphorous and sulaphur in the soils are the constituents of organic matter. These three nutrients become available to plants only after biological decomposition takes place. The unrecompensed minerals of the primary importance are necessary to supply power to the plant. The secondary weathered minerals have greater power to supply nutrients to the plants. Phosphorous is taken into soil in the form of phosphate. Phosphorous is needed after the need to nitrogen has been met. These two are restored to the soil by animal manure. The third is potash which is restored by farm yard manure or by artificial fertilizers containing potassium. Deficiencies are not always revealed by chemical analysis. For example, only a fraction of the phosphorous found on soil analysis is actually available to the plants[5].

The minor nutrients elements copper zinc, molybdenum may be deficient in soil to the point where they limits yield and affect the quality of crop[6]. Present in great quantities there elements, which include manganese, boron, copper, zinc, are phosphorous or toxic in their effect so that greatest care is needed in recognizing plant disease due to their absence or excess. Molybdenum is essential to ensure growth of tomato plant. A deficiency of boron leads to the cranky interior of some apples. Manganese deficiency affects greatly the yield of peas and potatoes[7].

Soil structure plays a vital role in determine the permeability of soil. There are four tippers of structures which are granular, blocky platy and single grain. The structures of the soil are inter-related with soil productivity and root growth. The color of the soil affects productivity. It also influences the temperature of the soil. The dark colored soil absorbs more heat than light color soil. Thus it is obvious that plant growth is directly influenced by soil temperature. The primary

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source of soil temperature is obtained through radiation from the sun. The temperature of the soil is dependent on the heat that soil absorbs in relation to the losses through radiation and evaporation of soil moisture. The soil which receives heat controlled by climate, color of the soil. Altitude and aspects of the land and the vegetations cover present of the soil.

It is no bouts that loss of soil under negative cover is minimum, but the clearance of vegetation and cultivated to feed the over-growing human population may result in the removal of soils. Under normal, physical, biotic and hydrological equilibrium in nature, erosion that takes place causes soil removal but it is fairly balanced gets disturbed by man's exploitation or by natural calamities, the soil loses its resisting power and eroding agencies become active and cause accelerated erosion.

The factors which influence soil erosion are:

(1) The amount and intensity of rainfall and wind.

(2) The type and condition of vegetation cover.

(3) The nature and properties of the soil.

(4) The slop of the land.

The amount and the intensity of the wind are of prime factor. It is usually not the total amount of rainfall that matters but the rate per hour at which it falls that determines the degree of water erosion.

Precipitation, the most effective factor, causes erosion through excessive run-off. The volume of run-off per unit of time should be greater when the rainfall is higher. Run-off that causes erosion is dependent on amount, duration, intensity and frequency of the rainfall and also the time of the season when rainfall occurs.

The nature and properties of the soils also effects the soil erosion. Some soils are eroded more readily than others under the same condition of rainfall, cover and slope.

The organic matter in the soil is important because of its high water holding capacity and its tendency to improve granulation. When the organic matter decreases as a result of growing of crops, the credibility of the soil increases.

Soil erosion is also influenced by many factors such as its structure, texture, the nature of the clay and the amount and kinds of salt present. The excess of soil erosion declines the fertility. If once fertility lost, the soil becomes unfit for cultivation unless it is re fertilized.

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It is a check the soil erosion so that the productivity could be maintained. The soil is most susceptible to erosion when the fields are base of vegetation. Soil completely covered with vegetation provides an ideal condition to absorb moisture and resist the attack of erosive agents, provided that the cover is continuous and the soil is well-permeated with roots. For the maintenance of nation's agricultural economy, necessary measure should be taken to conserve soil and water as for as possible.

It should be noted that the basic aim of soil and water conservation should be to reduce soil losses and to maintain the over- all productivity of the soil. The most important requirement is to keep the land undercover for a long time as for as possible and to allow more water to enter the soil and to reduce the amount and velocity of sun-off. Commonly used practices in soil and water conservation are strip cropping, crop rotation, mulching, planting of grasses and trees, contour tillage, contour bounding, terracing, construction of pond and reservoirs and the control of gullies. Cropping pattern should play a vital role to reduce the soil erosion. Different crops should be grown and harvested. Rotation means growing a set of crops in regular succession over the same field with in a definite period of time. Rotation of crops helps to maintain the fertility of soil and the increase the productivity.

In strip cropping, the strips are laid out parallel across the general slope, not necessarily on the exact contour. Wind strip a cropping in voles planting of regular form crops in straight parallel strips at right to the direction of the prevailing wind, without regard to contours.

Throughout India, the problem of soil erosion is too much serious to solve immediately. The cultivators are required to keep a close watch over their field so that erosion menace could be minimized. The government is also providing help in the form of financial assistance for improvement of soil fertility.

The scientists have also have been entrusted with the task to find out the cheapest and the best methods to save the soil from the cause of erosion. All the government agencies and institutions should extend co-operation to the farmers to conserve the soil on larger areas before the land becomes gullied or too expensive to reclaim.

Minerals and Manures

Minerals and Manures constitute the soul of soils. The soil must be rapid what is taken out of it. On the credit side, we have the gradual weathering of rock particles, the fixation of nitrogen by micro-organism, the decay of plant and animal remains, the farmyard manure and compost we return to the soil. On the debit side, we have what is removed from the soil so as to get agricultural produce. The relationship can exist efficiently only when required quantity of manure and fertilizers may be added to from whit a view to compensate for the loss.

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Green manure is the principal means of adding organic matter to the soil. It is also very useful as a means of carrying the nitrates accumulated in the soil during the follow period, if a rotation crop is not planted before rains. The green manure crop supplies organic matter as well as additional nitrogen particularly it is a legume crop. A leguminous crop not only produces 8 to 25 tons of green matter per hectare but also adds about 60 to 90 kg of Nitrogen when ploughed under[8]. This amount would be equal to an application of 3 to 10 tonnes of farmyard manure on the basis of organic matter and its nitrogen contribution.The experimental data regarding intensive cropping in the past few years in the different parts of country indicate that the best return out of chemical fertilizer is obtained when the chemical fertilizer are used along with the bulky organic manure which act as soil amendent[9].

Farmyard manure is valued all-round soil improver. It does not enter into competition with common fertilizers but should be used in conjunction with them. Its values are greater that can be assessed by the consideration of its content of plant nutrients. Not only does its supply to a greater or lesser extent all the plant foods that are likely to be deficient in agricultural land, but it improves the texture and tilt of soil. It also increases its capacity to hold water and to retain soluble nutrients that would otherwise be washed down beyond the root range of crop life. An average sample of dung contains where-as in Indian condition, it contains 3 percent potash[10].

Most of the nitrogen in dung is contained in organic forms and some only becomes readily available for crops.The farm yard manure can be applied to all crops. It is true that the use of farm-yard manure is probably the best means of maintaining the fertility of soil. There are different types of farmyard manures used e.g. liquid manure. Slurry, poultry, compost, sewage sledge, night soil and seaweed are the most important ones. The quantity of farmyard manure and the quality that depends upon the type and age of animals, the way they are fed, and the core taken in collecting and preserving the material.

The method of handling manure can be improved by the use of pot or heap method of storage. These methods of storage are better than the old ones because there is no additional expenditure necessary for turning or mining the manure, or for any extra water to keep it moist.

For centuries, night soil has been used as valuable manure in china, when used in raw state, it is a hazard to health, but when dried, composed or otherwise treated, it is relatively less harmful. In India, it has been estimated that 3.5 million tonnes annually are available. Night soil has an approximate composition of one percent nitrogen, .5 percent p^2o^5 and .1 percent K.O. Besides these, there are certain crops which are to be ploughed under as manure to improve the soil for a succeeding crop. These crops are known as green crops. The importance of leguminous crops and their use as green manure in improving soil productivity has been long known to the Indian farmers[11].

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The Growing of leguminous crops like sanhemp and dheincha in rotation with cereal or case crops help not only the supply plant nutrients but also to maintain soil fertility. Indian soil is in such a state that there is neither increase of production. It is, however, not difficult to increase the yield per hectare by manures and specially manures with nitrogen for which the land has the greatest hunger.

ARTIFICIAL FERTILIZERS

To-day, the area needs more and more out-putt from the land. In the developing world like India, where population is the most serious factor, it is necessary to keep pace with the growing demands for food grains. If man struggles for producing maximum food per unit area, per unit time, there is no alternative except to depend more and more on fertilizer.

The fertilizer has been playing a major factor in raising agriculture productive. It is true that the level of fertilizer`s use per hectare of cultivated land is closely linked with the label of crop production per hectare of cultivated land is closely linked with the label of crop production per hectare. Fertilizers are often regarded as substitutes for animal manures, but that is not a correct interpretation of their purposes. Animal manure improves soil condition and supply of nutrients, but they (fertilizers) are essentially the by-products of a particular form. Applying the commercial fertilizers, it is possible to improve fertility.

In general, plants need sixteen elements for their growth. They are carbon, hydrogen, oxygen, phosphorous, potassium, calcium, magnesium, sulphur, iron, boron, copper, manganese, zinc, molybdenum and chlorine. The first three elements are obtained from water. Nitrogen, phosphorous and potassium are required by the plant in large amount and are known as primary nutrients, white calcium, magnesium and sulphur are secondary nutrients. The requirement of the nutrients is generally supplied by the use of common nitrogen, phosphorous and potassium fertilizers. Calcium and magnesium are applied in acid soils. Some soils are low in sulphur. The amount of sulphur supplied by super phosphate is adequate for the requirement of the crops.

The quantity of fertilizer for application to each crop depends upon the level of nutrients available in the soil and the crop requirement. Lack of nitrogen results in poor growth of plant and a uniform yellowing of the leaves. Lack of phosphate is often associated with purple leaf color, particularly at edges, but in certain crop such as cotton and tobacco, the leaves become dark green. In rice growing areas phosphate is as important as nitrogen. Insufficient potash causes scorching of the leaf edges of many plants including tobacco, cotton, maize, groundnuts and many fruit trees.It has to be appreciated that balanced use of fertilizer is essential not only to maximize the production per unit time but also to improve the productivity of every unit of other costly inputs life water, labor, machinery, pesticides etc.

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The high yield potential of the new cereal varieties can be achieved only, if they are used in conjunction with adequate impute of fertilizer and water, careful attention of crop protection, and generally high standards of farming. For most traditional varieties of wheat and rice, fertilizer responses fall off at about 40 to 50 kilograms of nitrogen per hectare. For high yielding varieties, the response increases up to 100 kilograms or more. In India, recommended fertilizer does well in the case of the maxi can wheat when production is 80 to 120 kilograms N, 40 to 60 kilograms P_2 O_5 and absent 40 kilogram K_2O per hectare[12]. Pests and diseases are another problem. In addition to close attention to crop protection measures, it is essential to develop a number of disease resistant varieties. Batter cultivation practices are also needed while introducing the high yielding varieties.

Fertilizers also increase the efficiency of irrigation water and infect irrigation without fertilizer is like a resource waste. On a most conservative estimate, it is evident that if adequate fertilizers are available for all the irrigated lands in the area under study, food production can easily be stepped up to a new high level.

Raising the agricultural productivity, the technological problem should be assessed in relation to the level of production and input per hectare. The technical problem is neither a social nor an economic one. It is also not a problem of organization. The main headache is the media through which the farmers can be educated regarding the new techniques and technology which aim at increasing the productivity. Our farmers are illiterate and uneducated so it is necessary to create such type of environment which will enable them to put the new techniques into practice[13].

The influence of land tenure system is often over riding. This is one of the reasons that our new achievements have not reached to the farmer. Their fields are smaller and scattered. The small holding leads to great waste of time, labor and cattle power. Presently many difficulties are experienced with regard to the use of irrigation facilities and protection or crops from local diseases.

The credit system should be expanded in order to purchase different inputs. It is very necessary to pay more attention to price relation and other factors influencing the farmer's incentives to purchase inputs in order to raise the production and sales. The problem of marketing of surplus commodities and storage facilities should also be looked into. Efforts should be made to popularize modern technology so that productivity per hectare could be enhanced.

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