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A Sample Study of Agricultural Development

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Agriculture plays a key role in the development of any region. The development of human civilization was possible only after the mankind started agriculture. However the growth of agriculture in a particular region differs based on climate, soil, rainfall and proper agricultural practices over a period of time. The present study attempts to highlight the development of agriculture in the study area during the last 20 years. Attempts are also made to find out the effect of modern agriculture on ecology and to identify the effect of environmental changes on agricultural crops (Kumar et al., 2018; Kumar et al., 2020). During present studies two parameters have been considered, i.e., (i) agriculture development based variables and (ii) social development based variables. CharkhiDadri District is one of the 22 districts of Haryana state in northern India. District CharkhiDadri is located 112.6 km of India capital New Delhi and 295 km of Haryana capital Chandigarh CharkiDadri comprises of two sub-divisions (CharkhiDadri and Badhra) and two tehsils (CharkhiDadri and Badhra) and one sub-tehsil (Bondkalan).District CharkhiDadri is located between 28.5921 N Latitude and 76.2653 E Longitude respectively (https://charkhidadri.gov.in/). In four blocks of CharkhiDadri district, CharkhiDadri, Badhra, Jhoju and Baund Kalan. CharkhiDadri and Baund KalanBond block have good soil fertility potential (https://charkhidadri.gov.in/) while in Badhra and Jhojhu most of the area is covered with sandy soil. Agricultural and social development in four blocks of CharkhiDadri has been studied and results are presented.

Keywords: Agriculture, Irrigation, Soil, Fertilizers, Social development.

Agricultural development in four blocks of CharkhiDadri district has been presented here.

1. INTRODUCTION

Agriculture plays a vital role in India's economy. 54.6% of the total workforce is engaged in agricultural and allied sector activities (Census, 2011) and accounts for 17.8% of the country's Gross Value Added (GVA) for the year 2019-20 (at current prices) (Annual report 2020-2021 www.agricoop.nic.in).Most of the population of India is engaged in agricultural activities (about 60%), therefore agricultural development has a direct impact on the economic development of the country (Bhalla and Singh, 2010; Ghanshyam et al., 2019). Ancient undeveloped human societies to modern scientific human societies are associated with agricultural development. Ancient practice of shifting agriculture has today transformed into technological agriculture. Today the whole world has become one economy due to internet facilities, which permits new agricultural techniques being shared globally. It is imperative to study the meaning of agricultural development in this race of development.

Agricultural development is linked to the rate of environmental degradation and efforts of sustainable agricultural development. The agricultural development of CharkhiDadri district has been studied on the basis of four blocks. Based on the survey of all the four blocks, the level of agricultural development and its impact has been presented here.

2. STUDY REGION

Haryana in Northern India is located between 27° 37' to 30° 35' latitude and between 74° 28' to 77° 36' longitude. The altitude of Haryana varies between 700 ft. to 900 ft. above the sea level. An area of 1,553 sq km is covered by forests (https://icar.org.in/sites/

default/files/Doubling-of-Farmers-Income-02.pdf). The state has a total of 81 cities and towns and 6,759 villages. CharkhiDadrilying in Southern part of Haryana, falls under Zone III: which consists of six districts, namely Bhiwani, CharkhiDadri, Mahendergarh, Rewari, Jhajjar, Gurgaon and Mewat/ Nuh districts covering nearly 29%of the total area of the State.Zone III is having major area under Pearlmillet and rapeseed and mustard, and is also suitable for arid-horticulture, agroforestry, sheep and goat rearing, etc. CharkhiDadri is 96 km from the national capital Delhi and 285 km from Chandigarh, the capital of Haryana. It is connected to Delhi by road and railways.

CharkhiDadri district is located on National Highway 148-B. Which goes from Kothputli to Bathinda. The latitudinal extension is located between $28^0$35' to $28^0$59' Northern latitude and the longitudinal extension $76^0$16' to $76^0$27' Eastern longitude. Based on the data of year 2011 the area is 1370.59 km^2 and the total population is 5.02 lakhs. It has population of 2.65 lakh males and 2.36 lakh females. The main crops of CharkhiDadri district are Wheat, Mustard, Millet, Cotton and Rice.

It is a region of semiarid climate. The average annual temperature here is 24.6^0C and the average annual rainfall is 735 mm. Here irrigation is done through canals and tube wells (Choudhary et al., 2016).

2.1 Objectives

(i) To highlight the development of agriculture in Charkhi, Dadri district.

(ii) Level of development of modern agriculture and its effects on human, plants and animals. (iii) Major problems related to agriculture before facing the farmers to be solved at the priority level.

3. DATABASE AND METHODOLOGY

The survey questionnaire was prepared on the basis of the objective type questions and hypothesis of the research, in which 200 farmers of CharkhiDadri district were included. Survey was done on the basis of four blocks Dadri, Badhra, Jhojhu, and Bondkalan. 5 villages of each block, i.e., 20 villages of the entire district have been included in the survey.

10 farmers engaged in agricultural work from the village were asked questions with 50 from each block, i.e., total of 200 farmers which were included in the survey.

1. **Agriculture development based variables**

   (i) Size of holding
   (ii) Use of agricultural machinery
   (iii) Availability of fertilizers
   (iv) Crop Marketing
   (v) Marketing System
   (vi) Use of Improved Seeds
   (vii) Warehouse
   (viii) Government Support
   (ix) Contribution of income from agriculture to the maintenance of the family.
   (x) Use of organic technology.

2. **Social development based variables**

   (i) Family Structure
   (ii) House Structure
   (iii) Water Supply
   (iv) Electricity Facility
   (v) Kitchen Fuel Facility
   (vi) Treatment during illness
   (vii) Annual expenses of the family
   (viii) Use of modern resources
   (ix) Education level
   (x) Change from agricultural development to education
   (xi) Ecological impact of agricultural development

4. RESULTS

Agricultural Development Sample Study

Level of agricultural development in CharkhiDadri district and agricultural development brought changes in the lives of the people and impact on ecology has been included in the survey. Results are presented in Table 1 and Table 2 and Fig. 1.

Table 1:CharkhiDadri District: Distribution of Major crops area in Percentage

Major Crops	Block	2000-01	2020-21	Change in 20 years
Millet	Dadri	28.5	14.5	-14
	Badhra	28	16	-12
	Jhojhu	28.3	15	-13.3
	Bond	23	14	-9
Cotton	Dadri	9	11	2
	Badhra	7	7	0
	Jhojhu	7.5	8	0.5
	Bond	10	12	2
Rice	Dadri	1.8	2.9	1.1
	Badhra	0	0	0
	Jhojhu	0	0	0
	Bond	1.9	3	1.1
Mustard	Dadri	33	15	-18
	Badhra	36	17	-19
	Jhojhu	34	17	-17
	Bond	33	14	-19
Wheat	Dadri	21.5	29	7.5
	Badhra	16	28	12
	Jhojhu	18	28.5	10.5
	Bond	21	30	9
Chickpeas	Dadri	3	0	-3
	Badhra	5.5	0	-5.5
	Jhojhu	5	0	-5
	Bond	2	0	-2
Barley	Dadri	0.9	2.5	1.6
	Badhra	0.75	1.8	1.05
	Jhojhu	0.5	1.95	1.45
	Bond	0.8	2.3	1.5

Present work is about agricultural development in CharkhiDadri district during last 20 years. Areas surveyed were Dadri, Badhra, Jhojhu and Bond blocks of CharkhiDadri district. The cropping pattern of rabi crops like mustard, wheat, chickpeas and barley, etc., and kharif crops like millet, cotton, rice was studied in 2000-01 and in present time 2020-21. Area of major crops increased or decreased differently in different

regions. For example the yield of mustard crop in all four blocks increased but the area of mustard crop was decreased in all blocks of CharkhiDadri district.

The area of wheat increased from 16-21.5% (2000-01) to 28-30% (2020-21) and yield also increased (Table 1).

Chickpeas was widely cultivated in 2000-01 but no record of chickpeas cultivation were available. Like-wise area under cultivation of Barley and its yield also increased during last 20 years. (D.5-2.6 ton/ha-1) (Table 2).

Table 2: Charkhi Dadri District: Yield per hectare

Major Crops	Block	2000-01 yield ton/ha^{-1}	2020-21 yield ton/ha^{-1}	Change in 20 years yield ton/ha^{-1}
Millet	Dadri	1.8	1.9	0.1
	Badhra	1.9	2.0	0.1
	Jhojhu	1.7	2.1	0.4
	Bond	1.6	1.9	0.3
Cotton	Dadri	1.6	1.7	0.1
	Badhra	1.5	1.6	0.1
	Jhojhu	1.5	1.6	0.1
	Bond	1.6	1.7	0.1
Rice	Dadri	1.87	2.75	0.88
	Badhra	0	0	0
	Jhojhu	0	0	0
	Bond	1.9	2.8	0.9
Mustard	Dadri	1.9	2.1	0.2
	Badhra	1.9	2.1	0.2
	Jhojhu	1.8	2	0.2
	Bond	1.85	1.9	0.05
Wheat	Dadri	4.6	4.7	0.1
	Badhra	4.3	4.4	0.1
	Jhojhu	4.3	4.4	0.1
	Bond	4.4	4.8	0.4
Chickpeas	Dadri	1.3	0	-
	Badhra	1.6	0	-
	Jhojhu	1.5	0	-
	Bond	1.3	0	-
Barley	Dadri	1.9	2.6	0.7
	Badhra	1.5	1.9	0.4
	Jhojhu	1.6	1.9	0.3
	Bond	2.00	2.4	0.4

Now coming to kharif crops, millet area was reduced but yield per/ha-1 was improved (Table 2).

Farmers also have also placed greater area under cotton cultivation and its yield is also increased. Rice become important crop and present area increased from 1.8 to 3% during 2000 to 2021 (Table 1) and yield also considerably increased considerably in yield were also observed. Similar pattern was observed in both the blocks of CharkhiDadri district. However rice cultivation was not recorded in Badhra and Jhojhu.

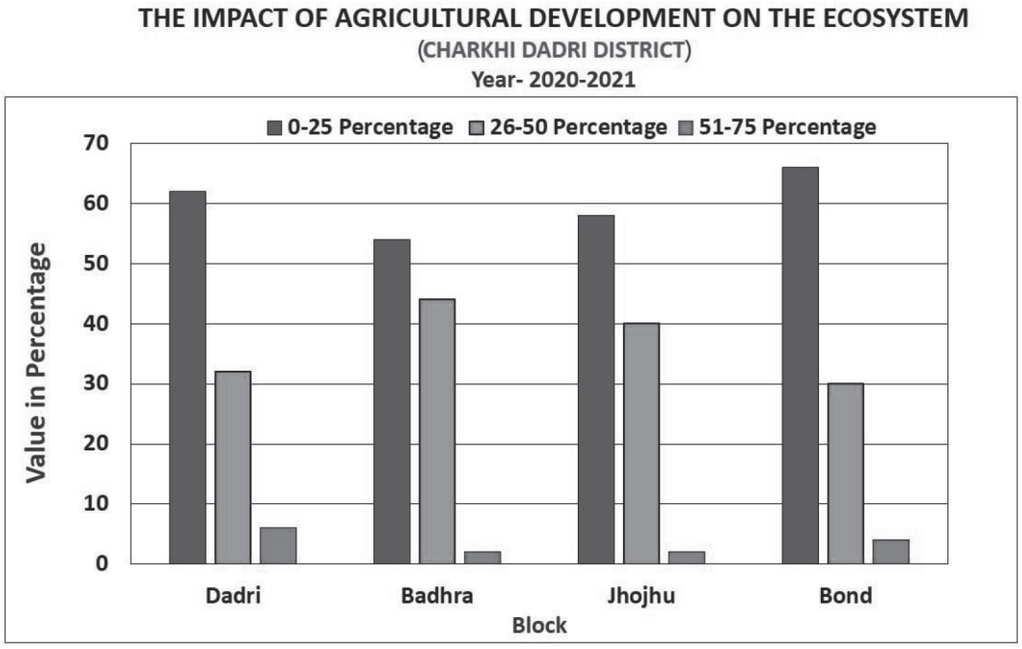

Fig.1: Agriculture utilises a large area of land water, fertiliser, pesticides which ultimately affect the ecosystem.

Farmers apply nutrients high doses of nitrogen and phosphorus fertilizers on their fields in the form of chemical fertilizers and animal manure. This provides crops with the nitrogen and phosphorus necessary to grow and produce the food. However, when nitrogen and phosphorus are not fully utilized by the growing plants, they can be lost in air or percolate into ground water. This negatively impacts air quality and downstream water quality.The Ecosystem is all the living plants and animals in the given area. Agriculture has influenced the ecosystem to a large extent. Impact of agriculture on ecosystem was assessed. However during the survey 60-65% farmers believed that there was change in ecosystem and impact was 25% (Fig. 1).

This is significant effect on the environment. However only 36.5% farmers believed that impact was 50% and only a small percent of the population believed that agriculture had any significant effect on the ecosystem. The farmers believe that there was no absolute change in the ecosystem due to agriculture. In contrast to this Röös et al. (2018) reported that climate impact from agriculture arises in EU mainly from emissions of nitrous oxide (N_2O) from soils, driven largely by N application (44% of GHG emissions from Swedish agriculture), carbon dioxide (CO_2) emissions from organic soils (12%), methane (CH_4) from enteric fermentation in ruminants (26%) and emissions of N_2O and CH_4 from manure management (5%).

During last 20 years the use of agricultural machinery was has increased in this district and there are almost hundred percent farmers used tractors, threshers, cultivators, seed drilling machines etc., in all blocks of CharkhiDadri district. But howeverrelatively less number of farmers used harvester in Badhra and Jhojhu block. Thus Agricultural machinery was is now used in almost all the blocks hundred percent. This indicates modernization of agriculture has taken place in all the blocks of CharkhiDadri district.

Around 50-70% farmers said that availability of fertilizers was excellent while 25% said satisfactory and the remaining reported inadequate supply of fertilizers. This supported the idea that presently large number of farmers use fertilizer which is now easily available.

In CharkhiDadri area 46% farmers sold their crops immediate after harvesting, while in Badhra area 72%, Jhojhu 64% and in Bond 70% farmers sold their crops immediately. However farmers kept 16% of produce for domestic use in Dadri, Badhra and Jhojhu area and while 18% in Bond area. Only limited number of farmers in Badhra and Bond (12%) sold it during the season at market price. However in Dadri area 38%, in Jhojhu 20% farmers sold their produce during high market price. The result shows that very limited number of farmers can hold the crop to for sale at the market price. It is concluded that 50-70% farmers sale their crop immediately after harvesting. Better storage facilities may be provided to farmers.

Large number of farmers complaint about poor transportation and mandi system, M.S.P. rates and payment was very poor. Very low number of farmers gave positive reply (14-26%) while majority of them said that it is inadequate particularly in Badhra, Jhojhu and Bond. Only in Dadri area around 32% complaint while 42% found its satisfactory. There is need to improve agricultural marketing system.

All most 96-100% farmers are using improved seeds (Kumar et al., 2013)and only 2-4% are using traditional seeds specially in Badhra and Jhojhu area.

In all the four blocks of CharkhiDadri district no storage warehouses of the government are available and farmers have to sale their vegetable crops immediately. If government storage warehouses are provided the farmers can also undertake vegetable cultivation to improve their income.

In order to double farmer's income by 2022 intensive vegetable cultivation on available land, on scientific lines, using latest technologies, should be adopted/promoted https://icar.org.in/sites/default/files/Doubling-of-Farmers-Income-02.pdf.). Although the government promotes vegetable cultivation but there is no M.S.P. guarantee or Govt. procurement system. The farmers have to sell their vegetables and other crops during the season at very cheap price. This can be improved in two ways.

(i) Building of storage facilities.
(ii) Government procurement system for all crops.

5. DISCUSSION

National Institute of Plant Health Management (NIPHM), Hyderabad is regularly conducting training programmes for Agricultural Officers (https://icar.org.in/sites/default/files/Doubling-of-Farmers-Income-02.pdf).Pradhan MantriKisanSamman Nidhi (PM-KISAN) Pradhan MantriKisanMaan-DhanYojana(PM-KMY) support the farmers. However 80% of the farmers said that the Govt. support for agriculture is inadequate. This means the supply of seeds, fertilizers, subsidy on purchase of farm equipment and technical advice is poor to very poor. The improved seeds are not supplied in time and the farmers sow traditional seeds which results in poor yield. Purchase of uncertified seeds from private sources increases the expenditure on inputs in agriculture. Such seeds from open market lack in various parameters of viability and vigour and give poor yields. A drop in crop yields could drive food prices higher, worsening inflation. Likewise timely supply of fertilizers is important for the farmers. The farmers squeezed by a massive shortage of fertilizers have to turn to the black market. Under these circumstances either farmers have to cut the use of fertilizers and risk lower production, or pay sky-high prices on the black market. Paying high prices on the black market will hurt the incomes of small and marginal farmers. Similarly equipment's subsidies take long time to be granted which results in purchases at higher costs and loss to the farmers. Farmers have continued to grow rice and wheat as dominant crops due to government incentives and market price ignoring the suitability of soil, climatic conditions and long term repercussions. The inappropriate land use and introduction of canal irrigation have resulted in soil degradation, soil erosion (8.5% by water and 12% by wind), salinity and alkalinity (9.7%) and water-logging (3.3%), besides nutrient losses as well as depletion of ground water at an alarming rate (https://icar.org.in/sites/

default/files/Doubling-of-Farmers-Income-02.pdf). Sub-Mission on Agro forestry (SMAF) under National Mission for Sustainable Agriculture (NMSA) is under implementation since 2016-17 to promote plantation on farmlands. National Mission for Sustainable Agriculture (NMSA) supports at least 30% of the budget allocation for women beneficiaries/farmers. Farmers also expect that the government will provide technical help on agronomic aspects, disease control, threshing and storage. The production technology seems to be the major key to improve the prospects of agriculture in the state. This may help to improve the farm income (Kumar et al., 2005).

Around 75-100% farmers depend on up to 80% of their income from agricultural sources and rest only 20% is generated from other sources. However very limited number of farmers have other sources of income. Thus largely farmers depend entirely on agricultural income.

Farmers are interested in organic farming of vegetables. Organic agriculture emerged as a reaction to the industrialisation of agriculture and its associated environmental and social problems (Röös et al., 2018). However the organic farming is adopted by negligible number of farmers in Dadri, Badhra and Bond (2-4%), while 0% in Jhojhu. During our inquiries from the farmers replied that they were not taking organic farming because in the absence of inorganic fertiliser and proper technology the crop yield is much less in organic farming.Critics consider organic agriculture inefficient, especially in terms of land use. Organic farming is a highly technical matter for which farmers need a special training and guarantee of purchase of their crop by the government. In addition to this certification procedure (which is essential for getting the premium price of organic produces) is painfully lengthy and very costly. Röös et al., (2018).Reviewed the risks and opportunities of increasing yields in organic farming.

The organic crop sells at much higher rates abroad and which promotes farmers interest in organic farmingin EU and USA. Organic Farming is being promoted under the Schemes ParamparagatKrishi Vikas Yojana (PKVY) and Mission Organic Value Chain Development for North Eastern Region (MOVCDNER) with a provision atleast 30% of the budget allocation for women beneficiaries/farmers (https://agricoop.nic.in/sites/default/files/).

In addition to this, adequate biological control measures and use of organic farm yard, manure has to be optimised for organic farming. All farmers whether sharecroppers, tenant farmers including women farmers growing crops in the areas notified by the concerned State/UT Government are eligible for coverage under Pradhan MantriFasalBimaYojana (PMFBY).

In contrast to olden times, when joint family system was working, presently only 20% families are in joint family system in CharkhiDadri district and around 80% are nuclear families. This has caused division of land and made agriculture non-productive. In other terms if a combined holding of five brothers, having five hectares in joint family system, is divided among five brothers, the resultant one hectare share of each brother will have considerable reduction in yield.

Despite of all the constrains of environment, soil and economic condition of farmers the increase in agricultural income has taken place and now housing conditions are much improved. Under Soil Health Card/Soil Health Management Schemes, there is no separate budget provision for women specific programmes (https://agricoop.nic.in/sites/default/files/). The State Governments are however advised to utilize 30% of funds released under the Scheme for women farmers. Farmers have improved their housing conditions. Although 70% farmers now have cemented houses with bathroom and toilet facilities only 30% could afford modern houses. Thus almost none is living in mud houses as was the past practice. Now villagersalso have better hygiene as 90% of the houses have toilets and bathroom inside their house and have running water supply.

The villagers now depend on conduit water supply in almost 90-95% houses. Presently only 4-10%villagers depend on tube well in Dadri, Jhojhu and Bond. However in less developed Badhraarea, 2% depend on the tube well for water supply. Thus majority of villagers are now having fresh water supply in their homes.

Majority of villages are now connected with electric grids and there is continuous electric supply in homes and fields. The electricity expenditure ranges from Rupees 760 to 946 per month per family. Electricity expenditure was found to be proportional to the prosperity e.g.,Badhra has minimum expenditure while Dadri and Jhojhu have maximum. In overall terms, the average expenditure was Rs 864 in CharkhiDadri district of Haryana.

Charkhidadri district has better availability of cooking gas supply in Dadriwith 74% people use cooking gas as compared to Bond, Jhojhu and Badhrawhere66, 64, 56% gas is used respectively. With availability of cooking gas, the wood fuel consumption has gone down to only 26% household Dadri block. However it was 44% in Badhra followed by Jhojhu and Bond. Kerosene oil was not used in the district for cooking. Our studies indicated that availability of gas has protected the forests, as people now use less amount of wood fuel.

People in Charkhidadri district generally do not depend on home remedies. Health is an important issue but as the government hospitals do not have good facilitieshence people don't like to go there. Charkhidadridistrict has around 91% population which goes to the private hospitals. Farmers spend lot of their income on treatment in private hospitals and it is expected that government should provide good medical facilities.

Due to poor facilities in education and health villagers have to spend around 20 percent of their income on health and 50 percent on education. Farmer's income does not increase in proportion to expenditure on education and health as the private institutions keep on increasing their fees. Thus only little money is left for other expenses. The govt. should take urgent steps to increase sourcesincome for farmers.

District of Charkhidadri is near Indian capital and its population uses large number of modern facilities like television, refrigerator, mobile phone, two wheeler and four wheeler. They also read newspapers even in villages. Theuse of colour T.V. and L.C.D. have been found in around 50% in Dadri block and upto27% in Jhojhu block. In Dadri district where almost 100% population uses mobile. Around 84-94% of population uses refrigerators. Thus onlyvery limited number (6-8%) do not have refrigerator in their homes. Availability of private vehicle, two wheeler and four wheeler has increased and the use of public transport has decreased considerably in which is up to 20%. In Bond which is near Bhiwani district majority of people, around 62%, use two wheelers and rest use different modes of public transport. Around 12-18% of farmers use vehicles like cars, jeep etc.This indicates that some degree of prosperity is coming to villages also. Around 24-36% of the population reads newspapers while a large number of the population (64-72%) does not read newspapers. Perhaps a majority of them are not literate although the literacy rate of Haryana is **67.91 percent**, which is comparatively higher than the National average which is 64.80 (https://www.google.com/search?q=literacy+rate+in+haryana). The social status of women is very poor. The female literacy rate at present is just 54.16% (https://cdnbbsr.s3waas.gov.in/s3cf2226ddd41b1a2d0ae51dab54d32c36/uploads/2020/12/2020123035.pdf).

Education is available in villages but only around 50% of the population studies upto under graduation. Out of which only 31% of population goes for master's degree.

Due to the developmentof agriculture, the income of the farmers has increased which has promoted higher education of 31% of the total population. However many families believe that this change in increased rate of higher education is not because of agriculture income alone as they depend on other income sources also.

6. CONCLUSION

6.1 Major Problems Related to Agriculture in Order of Priority

6.1.1. Not getting fair price for the crops

The cost of sowing, weeding hoeing, harvesting is very high. The value of the crop is not given on that basis, due to which farmers are not able to extract even their daily wages from farming.

6.1.2. Dearness

The price of crops is not being increased by the government at the rate at which dearness (DA) is increasing. The prices of fertilizer seeds are increasing continuously. Similarly, petrol and diesel has become so expensive that farmers are unable to buy it.

6.1.3. Irrigation system

There is always a shortage of water for irrigation. Water does not come in the waves on time because of which groundwater has to be used. Due to which the ground water level is going down and the salinity level of water is also increasing.

6.1.4. Government system

Government support is not received on time. Farmers have to wander for subsidy on agricultural equipments, due to which their wastage of time and economic losses occur. The credit facility to farmers is also not available on time.

6.1.5. Excessive use of chemical fertilizers and pesticides

The land is becoming barren due to the application of more chemical fertilizers and pesticides, which is reducing the yield. Due to the use of more fertilizers, weeds have started growing rapidly in the field and the problem of termites has increased in the tree plants.

6.2 The Impact of Modern Agriculture on the Ecology: In Order of Priority

6.2.1. **Effect on humans**:

- Mental illness among people is increasing much more than 20 years ago. Increase in mental stress in people leads to loss of memory.
- Blood pressure, which was uncommon earlier, but nowadays there are 70% blood pressure patients in every village.
- The number of cancer patients is increasing continuously due to polluted grains.
- Farmers working barefoot in chemical fertilizer fields are contributing to increasing incidences of skin diseases.

6.2.2. Effects on animals and birds:

- Many species of birds are on the verge of extinction by eating poisonous food. Mankind has destroyed habitats of birds by clearing the forests for modern agriculture.
- The quality of milk of milch animals has decreased due to increased incidences of diseases in the animals.

6.2.3. Impact on environment:

- Most of the impact of modern agriculture is on the air and land. At the time of spraying insecticides the air around the field becomes poisonous because of which many times farmers faint.
- Surface toxic water mixed with underground water also contributed to pollution of groundwater. Similarly burning of agricultural waste causes air pollution.

6.3. Climate Change

Production is affected due to non-availability of rain in time. The following changes have occurred due to the climate in the last 20 years.

6.3.1 **Early monsoon:**Monsoon comes either before time or after time.

6.3.2 **Monsoon crop:** The distribution of rainfall is poor. Heavy rain in one day then gap comes for several days. Crop is damaged due to the monsoon gap. Monsoon gap occurs in the month of August and the September receives more rainfall.

6.3.3 **Weather abnormalities:** During last 20 years the average rainfall has increased but rainy days are getting shorter.

6.3.4 **Drought problem:** Growing more rice crops in North-East Haryana reduces the temperature there, which causes the monsoon breaks in South-West Haryana and South Rajasthan. This leads to the problem of drought.

7. SUGGESTIONS FOR RESOLVING THE PROBLEMS: IN TERMS OF PRIORITY

7.1 Fair Prices for Crops

Minimum Support Price (MSP)Guarantee should be given to the farmers by the government and the way the prices of petrol and diesel are increasing, in the same way the prices of crops should also increase.

7.2 Debt Burden

Governments should provide fertilizers and seeds to farmers at cheap prices and petrol and diesel should be available to farmers at 50% cheaper rates. This may reduce farmer suicides by reducing debt burden.

7.3 Subsidy Money

Farmers should get the subsidy money on agricultural equipment immediately and subsidy money on manure and seeds should also come into the account of the farmers directly.

7.4 Online Farm Work Facilities

To do all the work related to farmers, online facilities should be provided by the government in every village and the prices of gas cylinders should be reduced.

7.5 Broad Level Water Storage Facility

Water storage should be arranged in every village so that irrigation can be done in case of non-availability of water in the canal on time and rain is not on time. And there should be a system to store rainwater in the water storage houses. There should be a proper drainage system.

7.6 Power Facilities

The power system should be repaired so that irrigation is not affected by the problem of frequent power cuts.

7.7 Warehouses

Warehouses for grain storage should be built in each village so that farmers can get fair prices when the price of crops increases in the market.

7.8 Cold Storage

To grow fruits and vegetables, the government should make each village aware as a unit. Cold storage should be arranged by the government in every village so that fruits and vegetables can be saved from deterioration.

7.9 Irrigation System

Canal and the drains should be repaired. Because of water leakage at places in the canal, there is a problem of water logging in the area around the canal. This results in exploitation of water resources on one hand while farmers face shortages in irrigation water.

7.10 Organic Fertilizers Factories

The government should open factories to make organic fertilizers in every village and their operation should be given to the agriculturally educated people of the village and organic fertilizers should be made available at cheap prices. This will lead to reducing the use of chemical fertilizers and pesticides by the farmers in the fields. The reduction in use of chemical fertilizers and pesticides will improve soil fertility and employment will also increase in the villages.

If an organic fertilizer factory is set up in the village, all the garbage of the village will be used in the factory. This will lead to cleanliness in the village. By keeping the village clean, there will be less insects, flies, mosquitoes, due to which diseases will be reduced in the village.

Today garbage heaps are found in every village all around the outside the village, which causes release of different types of toxins out of the garbage heap. Due to this environmental pollution increases and the people around are affected by the disease. These toxic elements get mixed in the underground water with the seepage of rainwater, due to which the ground water also gets polluted.

7.11. Technical Guidance

Government should provide technical and financial help for organic farming. Nutrient management based on Soil Health Cards (SHCs) need to be adopted extensively, as it can bring down cultivation costs by 10-25%, particularly on fertilizers (https://icar.org.in/sites/default/files/Doubling-of-Farmers-Income-02.pdf).

7.12. Crops According to Soil Fertility of Area

Farmers should grow crops according to the soil of the district. Cotton crop is the deadliest for the district as it is prone to heavy attack of diseases. Similarly, it is also not a rice area.

7.13. Horticulture Promotion

Horticulture should be promoted in the sandy areas of the district like Badhra and Jhojhu. Horticultural and medicinal plants, dates, plums etc., should be grown in this area.

References

Bhalla GS and Singh G. (2010). Growth of Indian Agriculture : A District Level Study, Final Report on Planning Commission Project, Planning Commission, New Delhi Survey Based 2020-21 (Thakur and Jagalan 2005).

Choudhary K,Kamla D, Rita and Phogat VK. (2016). Effect of drip and furrow irrigation methods on yield and water use efficiency in cotton. *Res on Crops*. 17:823-828.

Ghanshyam P, Khan Md,and Kumari S. (2019). 'Pathways of agricultural transformation : A comparative analysis of Punjab and Bihar'.*Agri Eco Res Rev.* 32:1-11

Kumar A,Tehlan SK,and Panghal VP.(2013). Studies on viability and vigour in coriander seeds stored under ambient conditions. *Haryana J Hortic Sci.* 38(1 & 2):129-133.

Kumar R, Hooda V, Singh RK,and Singh M. (2015). Effect of organic manure, bio-fertilizers and mulching on growth and yield of potato. *The Bioscan.* 10(1):403-406.

KumarA, OgitaS, and YauY.-Y. (Eds). (2018). Biofuels: Greenhouse Gas Mitigation and Global Warming Next Generation Biofuels and Role of Biotechnology Springer, Heidelberg, Germany. pp.432. ISBN 978-81-322-3761-72.

Kumar A, Yau YY, Ogita S, and Scheibe R. (eds). (2020). Climate Change, Photosynthesis and Advanced Biofuels. Springer, Singapore pp 490. https://doi.org/10.1007/978-981-15-5228-1_1

Röös, E., Mie, A., and Wivstad, M. et al. (2018). Risks and opportunities of increasing yields in organic farming. A review. *Agron. Sustain. Dev.* 38,14 https://doi.org/10.1007/s13593-018-0489-3

Thakur BR, and Jagalan MS. (2005). Trends in spatial concentration production and yield in Himachal Pradesh of Apple : A Spatial - Temporal Study. *Indian J Reg Sci.* 37(2):110-121.