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# VISION

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## INDEX

Sr. No.	Title of Research Paper	Author(s)	Page No.
1	A Study of Industrial Development of Parbhani District	Dr. V. S. Kshirsagar	1
2	Marketing Challenges for the new Millennium	Dr. Baljeet Kaur Oberoi	5
3	Use of Fertilizers and Sustainability of Indian Agriculture : Some Evidences	Dr. D. V. Shinde	9
4	Portrayal of Women in Shakespeare's Literary Work	Sanjay L. Khandel	15
5	Investigation of Before Competition State' Anxiety of Baseball Players	Anil Patil	21
6	Analysis of the Role of Medico-Socio Worker and Nurse in Medical Sociology	Dr. Ananda B. Kale	26
7	Human Rights and Child Labour : Indian Perspective	Dr. S. P. Ghayal	29
8	लॉर्ड रिपनच्या विविध सुधारणा : एक आढावा	सचिन उत्तमराव हंचाटे	34
9	नैसर्गिक वार्षिक कालावधीचे विश्लेषण	रामकृष्ण महाकाळ	40
10	दलित आत्मकथन : संकल्पना आणि स्वरूप	डॉ. अशोक कांबळे	47
11	शारीरिक फिटनेसला मदत करणारे घटक	राजेंद्र माणिकराव सुर्यवंशी	55
12	राजकारणातील महिलांच्या नेतृत्वाचा चिकित्सक अभ्यास	डॉ. रजनी बारोळे	59



## Use of Fertilizers and Sustainability of Indian Agriculture : Some Evidences

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### Research Paper - Economics

#### ABSTRACT

*Green revolution has brought the tremendous increase in the food grain production but at the same time the sustainability of Indian agriculture came in danger. The excess use of chemical fertilizers and irrigation has resulted to declining the sustainability of Indian agriculture. The declining sustainability is at alarming rate and hence the situation has forced to rearrange the agricultural technology. There is need to have alternative technology to protect the agricultural fertility. This article explores selected evidences regarding sustainability of Indian agriculture.*

#### Introduction:

Modern technology, which includes High Yielding Variety (HYV) Seeds, Irrigation, Fertilizers, Pesticides etc. has benefited the Indian agriculture and Indian farmers to large extent. Modern agricultural technology promoted the agricultural qualitative and quantitative growth. In the package of modern technology, the human and animal labour are increasingly being replaced by the mechanical power and chemical fertilizers. Irrigation and HYV seeds were being strong supportive. As a whole this package resulted into



green revolution and hence an expansion of new technology in Indian agriculture continues. Although modern technology is very much helpful in India in achieving the target of self-sufficiency in the production of food grains, but an impact of this technology on the environmental situation is very much complex and manifold. The modern technology led to considerable reduction in ground water balance, deterioration of soil health, diseases among human beings.

This situation explains that, the agricultural development and environment came into contradiction with each other. This contradiction has already led to different form of environmental degradation like deforestation, air and water pollution, besides other problems related to the fertility of the soil. Chemical fertilizers, Pesticides, Irrigation etc. have declined the sustainability of Indian agriculture.

Swaminathan (2001) argues that, 'Intensive cultivation of land without conservation of soil fertility and soil structure would lead ultimately to the springing up of deserts. Irrigation without arrangement for drainage would result into soil getting alkaline or saline. Indiscriminate use of pesticides and chemical fertilizers could cause adverse changes on biological balance as well as lead to increase in the incidence of cancer and other diseases. This would aggregately harm the sustainability of Indian agriculture'.

The main content of Modern Technology was Nitrogen, Phosphorous and Potassium (NPK). The effect of NPK on the sustainability has been harsh. India is the fourth largest fertilizer consumer in the world. The overall consumption of NPK increased by more than 15 times during the last 25 years and in the post-green revolution period it increased by 2.5 times and continued in the later period. (Mishra:1994:33) The consumption of chemical fertilizers and pesticides in Indian agriculture over the last four and half decade has been increasing tremendously. The consumption of NPK in 1960 i.e. before green revolution was just 292 thousand tones which increased to 2177 thousand tones in 1970-70 i.e. immediately after the green revolution. Over one decade the consumption level increased by about 7.5 times. This shows that, the green revolution has encouraged the consumption of chemical fertilizers. More interestingly the consumption of chemical fertilizers over the last four and half decade has increased by about 57.5 times. In case of consumption of pesticides very similar increase can be found. Compared





to 1971, the pesticides consumption level has increased by about 3.5 times. The use of Nitrogen (N) and insecticides are strongly dominating in the category of chemical fertilizers and pesticides respectively. Punjab, Andhra Pradesh and Uttarpradesh states are leading in the consumption of NPK and pesticides. Interestingly, the northeastern states of Indian are sharing very negligible. Over the years, especially after 1991, the use fertilizers and pesticides in these states is declining.

The use of chemical fertilizer was the central part of the green revolution in India. Green revolution has helped not only to increase the food production and supply, but also altered agricultural practices and cropping & trading patters. But on the other side, the over use of NPK have resulted into various dangers to the sustainability of Indian agriculture. (See Mishra: 1994, Mingsara & Benjavan 2001). Parikh Kirit (1990) and Nijkamp et.al (1990) have pointed out the regional sustainability in the world but, they argued that, the modern technology has resulted into the declining agricultural sustainability.

#### **Sustainability of Indian Agriculture: Some Evidences**

The modern technology has resulted into the overuse of NPK and change in agricultural method, which ultimately brought the danger to the sustainability of Indian agriculture. The scholars have identified very serious problems related to the environmental degradation. It can affect the productivity of land as well as human beings. Some of its serious selective effects can be discussed here.

The modern technology with overuse of NPK has degraded the Indian agricultural land very seriously. Mingsara & Benjavan (2001) argues that, "the land degradation is the result of erosion, nutrient depletion and chemical contamination. The salinity has affected 11 per cent of the Indian agricultural land." The rate of growth of degradation would be faster in the future, if it is controlled. Hence there is a need to readjust the method of cultivation. Swaminathan (2001) says that, "soil fertility get affected by the improper arrangements of water. Irrigation without arrangements for drainage would result into soil getting alkaline or saline". This is more related to 'water management'. On one hand the over use of NPK and on the other, improper water arrangements, both are collectively degrading the agricultural land. Continuous degradation of agricultural land would affect

adversely the productivity. The sustainability of agriculture is linked with food security in India. The land degradation may create food insecurity very soon. The population of India has crossed hundred-corer mark. At this alarming position, the food insecurity in the country could result into severe socio-economic problems.

The insecticides levels in the soil of Indian agricultural land can be stressed at alarming rate. Uttar Pradesh and Punjab states are leading in this case. This would lead the faster rate of degradation of agricultural land. The climatic changes also can affect the sustainability of agriculture. Excess burning of fossil fuels, continuous deforestation have created harmful climatic changes. By the year 2050, the Carbon dioxide content in the atmosphere may increase by 8 per cent, which ultimately affects directly and indirectly, the sustainability of Indian agriculture. Climatic change is a result of number of things. The global climatic change is occurring due to the release of green house gases. The change in climate could influence food production adversely in three ways- one, geographical shifts and yield shifts, two, reduction in the quantity of water availability for irrigation and three, loss of land through a rise in sea level, which would also cause salinization.

Keeping aside the severe adverse effects of modern technology on human beings, this technology more specially the NPK has resulted into the declining sustainability of Indian agriculture. Indian economy even in 21st century, is agricultural economy. The food supply depends on the sustainability of agriculture. If a country wants to maintain the food security in future, the sustainability of agriculture must be maintained.

#### **Sustainability of Indian Agriculture: Some Efforts**

The green revolution has been central to agricultural success of India. The food production, food processing, transport activities increased substantially. But at the same time, the point of degradation of agricultural land began. The agricultural land in India is extensively degraded and the cost of restoring land would be massive. However many scholars have suggested some efforts of maintaining the sustainability of Indian agriculture.

Ramakrishna P. S. (1993) studied the Northeastern states of India. He argues that, 'the traditional method of agriculture has resulted into high yield'. This experiment has forced to rearrange the agricultural technology. The soil fertility could be maintained. The 'Jhum' cultivation has benefited the agriculture. Rice, Broom, grass, bamboo,





pineapple, ginger etc. can be cultivated. The inputs for these crops are inorganic fertilizers and human labour. The author says that, the traditional technology can maintain the sustainability of Indian agriculture. Perhaps this might have decreased the use of fertilizers and pesticides in northeastern region. However the geographical condition of Northeastern states is very much different than the rest of Indian states. Hence the author's suggestion may have some technical limitation.

Mishra S.K. (1994) argued in a similar way. He writes that, there is need to shift back from modern agricultural technology to traditional agricultural technology. Further the author recommends using the green manures and bio-fertilizers in agriculture to maintain the sustainability.

Swaminathan(2001) throws a clear light on maintaining the sustainability of Indian agriculture. He suggests six principles of maintaining sustainability. They are- Land Management, Water Management, Pest Management, Credit Management, Energy Management and Research & Development. Further he writes that, 'agricultural techniques like integrated nutrient supply involving a blend of bio-fertiliserz, organic and green manures and mineral fertilizers. Integrated pests management involving genetic biological and cultural control methods as well as need-based application of chemical pesticides, will ultimately help to combine economic efficiency and sustainability'.


Mingasara and Benjavan (2001) also recommend to use the mixture of bio and chemical fertilizers according to the need of the agricultural land. The author is very much careful about the degradation of Indian agricultural land and hence suggests maintaining the sustainability.

All the authors have stressed to maintain the sustainability of Indian agriculture. The modern agricultural technology cannot be encouraged extensively. The rate of degradation is at alarming rate and hence there is need to rearrange the agricultural technology accordingly.

#### Conclusion:

Many studies have been done on the sustainability of Indian agriculture and post-green revolution period. Green revolution has brought the tremendous increase in the food grain production but at the same time the sustainability of Indian agriculture came in



  
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danger. The scholars have blamed the over use of NPK and misuse of the content of Modern agricultural technology. The declining sustainability is at alarming rate and hence the situation has forced to rearrange the agricultural technology. Some scholars have suggested to follow the biotechnology and some have to follow the combination traditional and modern technology. The experiments of the scholars have brought one conclusion that, the green manures & local manures can reduce the adverse effects of chemical fertilizers. Hence the combined technology can be suggested. The sustainability of Indian agriculture is an important issue, which must be handled very carefully. Both the technologies have their own limitation, therefore a combination of indigenous technology and modern technology would lead the sustainability of Indian agriculture.

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