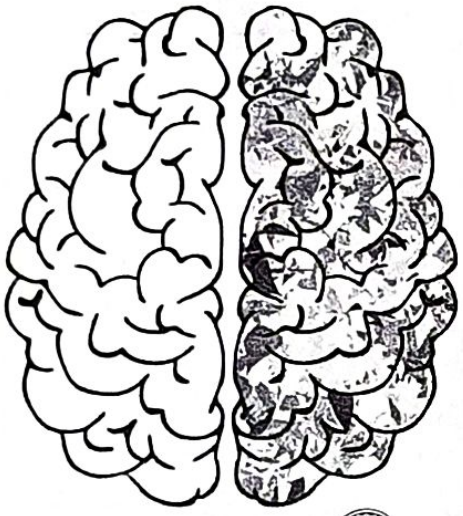
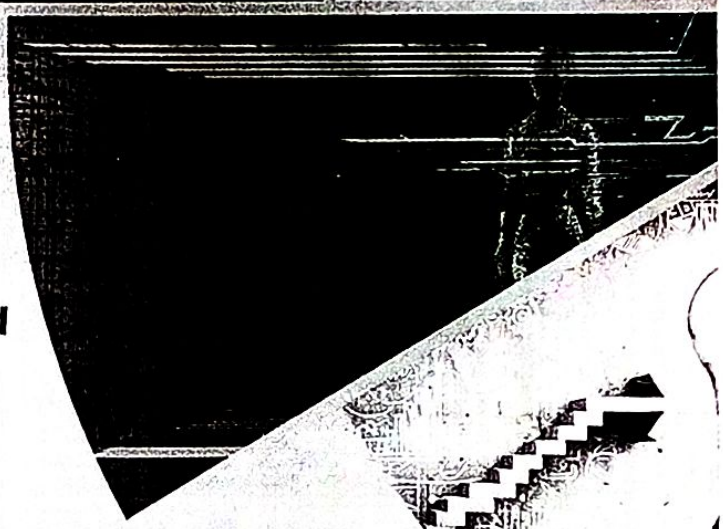
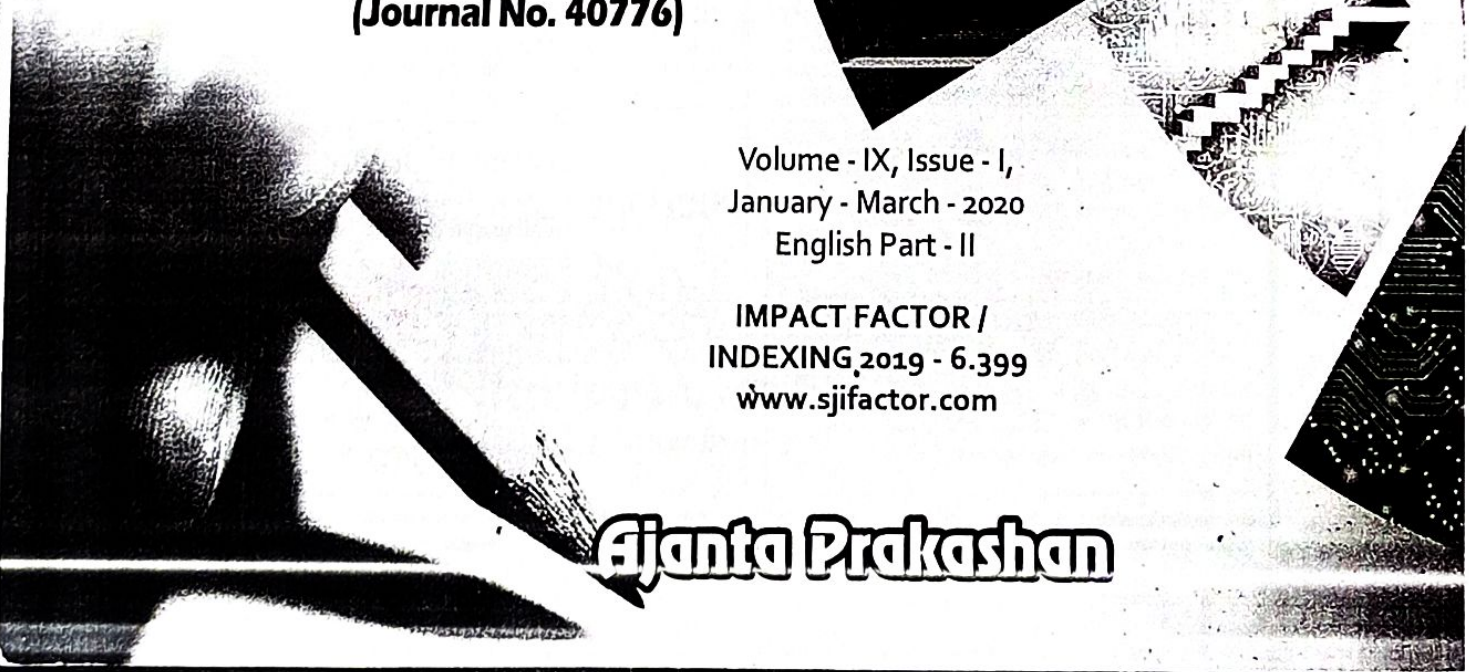
ISSN 2277 - 5730

AN INTERNATIONAL MULTIDISCIPLINARY
QUARTERLY RESEARCH JOURNAL

AJANTA







Peer Reviewed Referred and
UGC Listed Journal
(Journal No. 40776)

Volume - IX, Issue - I,
January - March - 2020
English Part - II

IMPACT FACTOR /
INDEXING 2019 - 6.399
www.sjifactor.com

Ajanta Prakashan

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IMPACT FACTOR / INDEXING

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Aurangabad. (M.S.)

20. Best Farming Techniques in India Scenario

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Introduction

India has made impressive strides on the agricultural front during the last four decades. Much of the credit for this success should go the several million small and marginal farming families that form the backbone of Indian agriculture and economy. Policy support, production strategies, public investment in infrastructure, research and extension for crop, livestock and fisheries have significantly helped to increase food production and its availability.

Objectives

1. To understand the concept of Agricultural
2. To study the best farming Techniques in Indian scenario

Research Mythology

The research paper is based an the secondary data sourced from books, journals, magazines articles and media reports, national and International journals, government reports, publications from various websites which have been

Best Farming Techniques in India Scenario

India has made impressive strides on the agricultural front during the last four decades. Much of the credit for this success should go to the several million small and marginal farming families that form the backbone of Indian agriculture and economy. policy support, production strategies, public investment in infrastructure, research and extension for crop, livestock and fisheries have significantly helped to increase food production and its availability. During the last 40 years, India's food grain production has increased more than twice from 123.2 million tones in the ending of Fifth Five Years Plan of 1979 to 284.8 million tones in 2017-8. Virtually all of the increase in the production resulted from yield gains rather than expansion of cultivated area. Availability of food grain per person increased from 455 g per capita per day to over 518 g per capita per day, even as the country's population swelled from 683 million to nearly 1300 million.

Nevertheless, further increases in the production of cereals and non-cereal agricultural commodities will have to be essentially achieved through increase in productivity, as the

possibilities of expansion of area and livestock population are minimal. India agriculture needs immediate attention to bring economics advantages to millions of farm families through enhancing agricultural productivity as remains low for many crops when compared to other countries. Best management practices are livelihood of farmers, especially marginal and small farmers who make the major chunk of our country. There are many such practices which are able to sustain production and productivity without deteriorating soil health and environment.

1. Conservation Agriculture (CA)

Conservation Agriculture (CA) has been viewed as an important strategy against food security challenges posed by climate change. Deterioration and depletion of soil health, reducing or stagnating crop yields, land degradation and environmental pollution. Currently, CA has spread to about 8 percent of world's crop lands and has also gained some ground in India over last one and half decades.

The rice-wheat dominated region is also surrounded by rice/sugarcane-wheat growing regions, western Utter Pradesh and Haryana, where a huge amount of rice and wheat crop residues are generated but due to a low population of dairy/ draught animals their disposal is a problems: thus framers burn the crop residues in-situ to clear the fields and make them ready for the next crop, which cause a very serious atmospheric pollution problems, particularly during November-December months when rice moisture stress are other serious issues of crop production. Thus, conservation agriculture has a good scope in this geographically important region. Any sound research efforts made here can be easily shown/demonstrated or disseminated to a large number of targeted groups or clientele.

Conservation Agriculture is defined as a sustainable agriculture production system comprising a set of farming practices adapted to the requirements of crops and local conditions of each region, whose farming and soil management techniques protect the soil from erosion and degradation, improve its quality and biodiversity, and contribute to the preservation of the natural resources, water and air, while optimizing yields. This novel resource conservation practice encompasses no or minimum sol disturbance, providing a vegetative soil disturbance, providing a vegetative soil cover through crop residues or other cover crops, and crop rotations for achieving higher productivity and reducing adverse environmental impacts.

The CA shouldered by three major pillaring principles, viz, i) minimum soil disturbance; ii) cropping system diversity, crop rotations, which must be fulfilled to CA objectives. Regarding

minimum soil disturbance, there can be no-tillage (NT) or reduced tillage (RT) restrictive to primary tillage only. These three related core principles must be concurrently applied to create synergies. All three principles show lot of promises in alleviating problems like sustaining soil health, conserving natural resources, fulfilling basic needs for cereals, pulses, oilseeds and vegetables, regulating farm income, securing food and nutritional security, reducing the use of external inputs, ensuring environmental safety and creating employment opportunity.

Government of India has made provision of Rs.1140 core in the Budget 2019-20 for eco-friendly management of crop residues plains. Similarly, many states are also committed to demote residue burning and promoting CA based practices through providing subsidies on suitable machineries like 'Happy Seeder'. It has now been seen that residue burning has reduced drastically in Indo-Gangetic Plains. CA based crop management practices not only enhance crop productivity but also reduce coast of production and maintain soil health.

2. Integrated farming-systems (IFS)

One of the best approaches for implementing best management practices in agriculture is by building farm resilience through spreading risks and creating buffers, i.e. not putting 'all fruits in one basket'. The Integrated Farming Systems approach is considered as important and relevant, especially for the small and marginal farmer as location-specific IFS will be more resilient and adaptive to climate variability. Integration of livestock rearing with crop production gives higher economic returns as compared to crop production alone for both marginal and small farmers. On-station and on-farm research in different regions of the country has resulted in identification of many sustainable and profitable IFS model for rainfed areas. In general, in regions with rainfall of 500 to 700 mm, the farming systems should be based on livestock with promotion of low-water requiring grasses, tress and bushes to meet fodder, fuel 1,100mm rainfall regions, crops, horticulture and livestock-based farming systems can be adopted depending on the soil type and the marketability factors.

Runoff harvesting is a major component in this region in the watershed-based farming system. In areas where the rainfall is more than 1,100 mm, IFS module integrating paddy with fisheries is ideal. Under irrigated areas the following IFS models are most suitable to maintain soil fertility and productivity.

- Intensification and diversification of crop component of farming system.
- Diversification of other components of farming system for higher income

IFS proves it's tremendous potential for developing farms to their optimum levels by integrating different enterprises in a farming system made to make agriculture a profitable venture for farmers under different agro-climatic and ecological situations.

3. Precise Nutrient Management and Soil Health Cards

Soil Health Card (SHC) scheme was launched on 19th February 2015 and till 2018 nationwide a large number of SHC_s were issued and accordingly nutrient management was done which resulted in record foodgrain production in even drought like conditions. Site-specific Nutrient Management relies on principles of '5Rs', the right source, and the right manner.

The site-Specific Nutrient Management (SSNM) approach emphasizes 'feeding' crop with nutrients as and when needed SSNM strives to enable farmers to dynamically adjust fertilizer use to optimally fill the deficit between the nutrient needs of a high-yielding crop and the nutrient supply from naturally occurring indigenous sources such as soil, organic amendments, crop residues, manures, and irrigation water. The following nutrient management strategies are the most efficient methods to enhance nutrient use efficiency in the field crops.

1) Use of neem coated prilled urea and zinc sulphate-coated urea is beneficial in increasing grain yield attributes, agronomic efficiency and apparent nitrogen recovery of field crops.
2) Production of hundred per cent neem coated urea for improvement in soil health and reduction in the attack of pests and diseases. This leads to decrease in the use of plant protection chemicals, overall increase in crop yield and the reduction in use of urea for non-agricultural purposes.
3) Use of biofertilsers like the application Phosphate Solubilising Bacteria (PSB) and Vesicular Arbuscular Mycorrhizae (VAM) along with rock phosphate provide higher productivity of field crops. These bio-fertilizers enhance root length, root volume and root dry weight which results in robuts plant growth and higher yield.
4) Application of NPK fertilizers is adjusted to the location and time as per the needs of crops based on soil Health card.
5) Leaf Color Chart (LCC), Chlorophyll meters and Green Seeker based nitrogen managements which ensures that nitrogen is applied at the right time and in right amounts as needed by the crop, which reduces wastage of N-fertilizer.

6) Integration with other Integrated crop management (ICM) practices such as the use of quality seeds, optimum plant population and efficient water management.

7) Fertigation is the most efficient method of fertilizer application, as it ensures uniform application of the water and fertilizers directly to the plant roots as per the crop demand. Since both water and nutrients reach directly to the rooting zone, it has tremendous effect on resource saving.

8) Use of software-based skills like-Nutrient Experts, Crop Manager, Geographical Information System (GIS) and Global Positioning System (GPS) in monitoring and application of nutrients.

4. Efficient Water Management

With the mission of 'per drop more crop', the Government of India has allocated more funds under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) so that more area can be covered under irrigation by encouraging drip and sprinkler irrigation and development of small water sources like farm ponds. In arid and semi-arid regions, where precipitation is low or infrequent during the where precipitation is low or infrequent during the dry season, it is necessary to store the maximum amount of rainwater during the wet season for use at a later time, especially for agricultural water supply. Uses of collected water include provision of drinking water, water for livestock and irrigation, diversion of run-off water for infiltration in water-scarce cropping areas, and refill of aquifers (groundwater recharge).

For this, both in -situ and ex-situ rain water management play crucial roles for increasing and sustaining the crop productivity. In the union budget of 2018, under the 'Har Khet ko Pani' a component of PMKSY scheme, the ground water irrigation scheme was implemented in 96 districts, where less than 30 per cent land is currently getting an assured irrigation facility. The pressurized micro irrigation systems not only save water in food grain production but also contribute to higher productivity, cost effectiveness, higher water productivity and energy use efficiency compared to conventional irrigation methods.

5. Organic farming

Organic farming in India has been reinvented and getting more popular with each passing day. Farmers, entrepreneurs, researchers, administrators, policy makers and of course consumers are showing increasingly greater interest in promotion and development of organic farming in

the country. Organic food products are considered to be much safer and nutritious than the products produced by the conventional farming.

Organic farming also helps to restore soil health, protect environment, enhance biodiversity, sustain crop productivity and enhance farmer's income. Seeing the long-term benefits of organic farming, the Government of India has taken many important steps for its promotion in the country. With the support of all kinds of stakeholders and the Government, the scope of organic farming movement has widened tremendously in India. The main objectives of organic farming or *paramparagat kheti* are the following:

1. To promote the use of natural resources based on integrated, sustainable and climate-friendly farming practices.
2. Reducing the dependence of farmers on external inputs, promotion of soil fertility, natural resource protection and nutrient recycling.
3. Reducing the cost of agricultural production of farmers of that per unit income can be increased.
4. Protecting the environment from hazardous inorganic chemicals by adopting conventional techniques and farm-friendly technologies, which are cost effective.

6. **Crop Diversification**

Crop diversification proved to be of paramount importance in mitigating the environmental problems arising on account of monoculture. Inclusion of certain crops in sequential and intercropping systems has been found to reduce some obnoxious weeds to considerable extent, thereby reducing the need of herbicides to a great extent in areas where such weeds have assumed alarming problem. Inclusion of legumes in cropping systems has been found to be effective in reducing the nitrate leaching in lower profiles.

Legume intercropping in cereals grown with wider row spacing has been found beneficial. There is need to diversify crop cultivation with pulses, oilseeds, fibre crops along with high value crops like fruits, vegetables, flowers, medicinal and aromatic plants, spices, etc as per agro-climatic conditions and resourcefulness of the farmers for efficient management of natural resources and higher productivity. The adoption of suitable agro-forestry options would certainly enhance the productivity of the farm along with soil health and farm income.

7. Resource conservation technologies [RCTs]

RCTs refer to those practices that conserve resources and ensure their optimal utilisation and enhance input useefficiency. These techniques include zero or minimum tillage (save fuel), permanent or semi-permanent residue cover, new varieties that use nitrogen more efficiently, laser land leveling that save irrigation water, system of Rice intensification (SRI), Direct Seeded Rice (DSR), use of leaf Color chart (LCC) for precision application of nitrogen and brown manuring helpful in suppressing weeds and increasing the yield. RCTs are more effective in combinations rather than their individual application.

8. Integrated Crop Management (ICM)

ICM suggests the use of good Agricultural Practices (GAP) such as Integrated Nutrient Management (INM), Integrated weed Management (IWW), Integrated Disease Management (IDM) and Integrated Pest Management (IPM), etc,. for raising a good crop. Thus, ICM is an alternative system of crop production, which conserves and enhances natural resources while producing quality food on an economically viable and sustainable foundation.

Is also covers integrated tillage and water management approaches in a holistic manner. It combines the best of traditional methods with appropriate modern technology for balancing the economic production of crops with positive environmental management. ICM is particularly beneficial for small and marginal farmers because it aims to minimise dependence on purchased inputs while utilizing on-farm resources.

9. Small-Farm Mechanisation

Timeliness of operations has a significant role for increased germination and required plant population, good crop stand and sustained productivity of crops. Large areas remain fallow or planted late due to poor access to farm machinery which results in low crop productivity. Therefore, improved access to the farm machinery for sowing, harvesting and other operations is an important adaptation strategy to deal with climatic variability such as late onset of monsoon, mid-season and terminal droughts and contributes to timely sowing of post-rainy crops.

Many efficient low-cost farm implements were designed for various operations. these reduced 20-59 per cent operation cost, saved 45-64 per cent in operation time, saved 31-38 per cent seeds and fertilizers and increased productivity of dryland crops by 18-53 per cent. In the recent past. Custom-hiring of agricultural machinery became an appropriate institutional arrangement which promotes mechanization of agricultural operations on small farms. For the

first time, a systematic attempt has been made under the national innovations on Climate Resilient Agriculture (NICRA) to setup one custom-hiring center each at the 130 climatically vulnerable villages across across the country.

10. Climate Smart Cropping

In the changing climate scenario, developing cultivars resistant to climate change may become important adaptive mechanism for maximizing resource-use efficiency. For example, crop varieties those are resistant to lodging (e.g., short rice cultivars), withstand strong winds during the sensitive stage of crop growth, are viable alternative. Similarly, change of planting dates to minimize the effect of temperature increase and reducing spikelet sterility can be used to enhance yield stability by avoiding the flowering period of coincide with the hottest period. Such adaptive measures like change in crop calendar to reduce the negative effects of increased climatic variability in arid and semi-arid tropics prove advantageous in avoiding extreme weather events (e.g. typhoons and storms) during the growing season.

11. **Protected Cultivation:**

Protected cultivation or greenhouse cultivation is the most contemporary approach to produce, mainly, horticultural crops qualitatively and quantitatively and has spread extensively the over the world in the last few decades. It is also known as Controlled Environment wherein factors like the temperature, humidity, light, soil, water, fertilizers etc. are manipulated to attain the maximum produce as well ass allow a regular supply of them even during off season. By adopting protected cultivation technology, By adopting protected cultivation technology, the growers can look forward to a better and additional remuneration for quality produce.

The main purpose of protected cultivation is to create a favorable environment for the sustained growth of crop, so as to realize its maximum potential even in adverse climatic conditions. Protected cultivation technology offers several advantages to produce vegetables, flowers, hybrid seeds of high quality with minimum risks that arise due to uncertainty of weather while at the same time ensuring efficient use of resources. This becomes relevant to farmers having small land holdings who would be benefitted by a technology, which helps them to produce more crops each year from their land, particularly during off-season when the prices are higher.

Conclusion

1. This kind of crop production system could be adopted as a profitable agro-enterprise, especially in peri-urban areas.
2. At present, there is a large gap between the demand and production of these crops to meet both quantitative and qualitative needs of domestic and export markets which are difficult to be bridged with the traditional cultivation practices.
3. Thus, protected high-value horticultural crops have great potential to enhance income especially of small farmers in India if appropriate technological interventions are made.

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