

Sustainable Agriculture Practices in Jharkhand

1. Agriculture in Jharkhand

Despite being an agrarian state, Jharkhand fares very poorly in terms of irrigation of its agricultural land. The state's undulating hilly terrain and soil structure does not support canal based irrigation system; as much as 92% of the cultivated area in the state is unirrigated in contrast, states like Punjab have as high as 95 percent of their sown area under irrigation. The lack of irrigation facilities has restricted the agriculture sector growth of the state, in addition small farm holdings and economic limitations result in low agricultural productivity. However, high seasonal rains ensure that despite constraints, the farmers are able to grow crops and survive.

The favourable agro-climatic conditions also facilitate the year-round production of various types of off-season vegetables and fruits. The soil as well as the climatic conditions of the state is favourable for the growth of mushroom, tea, ornamental plants and spices.

Agriculture in Jharkhand is heavily monsoon dependent and irrigation facilities in the state are limited. The state receives 80-82% of the annual rainfall during monsoon hence majority of state's agriculture production is confined to kharif season (June-September). 40% of the area in the state is under mono crop.

Nearly 70% of the area during kharif is under paddy. Most of this area remains fallow during the rabi season, leading to cropping intensity level 117%. The productivity of all the crops, except pulses are below national average.

Adopting sustainable agriculture practices is key to long-term increase in yield without depleting or disturbing the natural resources of the eco-system. The State has faced occasional water shortages in last few years and this has impacted all the sectors dependent on water. The State Government is committed to adopt available new technologies and practices to optimize resource utilization and improve the sustainability of the agriculture sector.

2. Challenges faced by Agriculture sector in state

- Soil is acidic in nature (pH is less than 5.5 in 1 million ha of cultivated area) and there is deficiency of sulphur, boron, zinc and copper in 0.15 million ha of cropped area. About 60% of the soil is deficient in phosphorous availability.
- The sloping landscape of the State, coupled with narrow spread of rainfall, has led to soil erosion and shallow depth of soil. Soil erosion in the form of sheet and gully erosion over an area of 2.3 million ha every year.
- In general, erratic distribution of rainfall, poor water holding capacity, high infiltration rate, unproductive soil texture, poor fertility of soil and acidity have put a heavy stress on crop productivity and crop diversification in the state.
- Consumption of fertilizer in the state is 92 kg/ha as compared to the national average of 140 kg/ha.
- Inadequate input availability (Irrigation- 12%; low seed replacement rate for paddy (16%), maize (12%), pulses (13%) and oilseeds (30%); inadequate availability of seed and planting material, in general.
- At the national level 76% of the total cultivable area is under net sown area, whereas in Jharkhand only 43% of land is cultivated. Cropping Intensity in the state is 117%, the per capita net sown area is just 0.083 ha which is quite low in relation to the per capita land holding (0.14 ha approx.).
- Lack of organized marketing facilities, and absence of effective value chain management
- Economically constrained farmers (BPL population- 31.8%).

3. Climate Change and its impact

In Jharkhand, there is reported rise in average rainfall in parts of state and this increase is not only steady but also significant and has potential of changing the agriculture pattern. The rainfall data available for Ranchi region for last five decades indicates that the average rainfall has been rising steadily and now the state gets 30% more rainfall than what it was getting in 60's. But precipitation trends of the state as whole show a very different trend. The information available on a 100 year time frame establishes that the annual precipitation in the state has gone down significantly by an average of 150mm, monsoon rains have seen the biggest shift.

The summary of the impact of change in temperature and CO₂ concentration are tabulated below:

Crop	Impacts of increase in temperature	Impacts of increase in CO₂ concentration
Paddy	Keeping the CO ₂ level constant at 380 ppm, a temperature increase of 2° C will result in yield loss of ~ 18%.	Keeping the temperature rise constant at 0°C, and an increase in the CO ₂ concentration at 400 ppm, the yield is expected to rise by 16.27%.
Wheat	A 0.5° C increase in winter temperature could reduce wheat crop duration by seven days and reduce yield by 0.45 ton/hectare. An increase in winter temperature of 0.5°C could cause 10% reduction in wheat production.	----
Maize	Increase in mean air temperature by 3°C above the present ambient conditions would reduce maize yield.	An increase in CO ₂ concentration up to 700 ppm has a positive effect on the maize yield. However, temperature rise dominates over the positive effect of CO ₂ concentration significantly when it is 3°C above the current ambient temperature conditions
Mustard	Rise in temperature by 5°C would reduce yield by 20.9%	Increase in CO ₂ level to 450 and 550ppm respectively would increase the crop yield
Milk Production	The decline in minimum temperature (>3° C) during winter and increase (>4° C) in summers can negatively impact milk production by up to 30%	----
Poultry	For ambient temperature ≥ 34° C, mortality due to heat stress increases in heavy meat type chickens (8.4%), 0.84% in light layer type, and native type (0.32%) chickens. the temperature rise affects the health and habits of chicken, the feed consumption decreases from 108.3 g/bird/day at 31.6°C to 68.9 g/bird/day at 37.9°C. At shed temperature of 42°C, the mortality rate of chickens will be very high.	----
Egg production	For ambient temperature ≥34°C, the egg production is expected to decrease both in broiler (by 7.5%) and layer (by 6.4%) breeders.	----

Source: SAPCC, Jharkhand

4. Adoption of Climate Smart Agriculture

The agriculture productivity can be improved and at the same time emission reduction co-benefits can be easily achieved by improving the efficiency of the agriculture operations, this will also reduce the input costs. The efficient use of area under agriculture, fertilizer selection and method of application and water use can help reduce methane as well as NOx emissions.

- Crop selection: Switching to rice varieties that require relatively lesser amount of water.
- Multi cropping: Adopting multi cropping practices to reduce the crop failure risks.
- Smart irrigation: Utilizing water saving techniques, using energy efficient water pumps, sprinkler/ drip irrigation. Smartly locating percolation tanks that help maintain soil moisture reducing irrigation requirements.
- Reducing irrigation linked energy use: Discouraging use of energy inefficient water pumps by smart energy pricing and controlling leakage of kerosene from PDS system.
- Promotion of RE irrigation systems: Promotion of solar water pumps will not only help the farmers reduce dependence on rainfall but also help control the GHG emissions.
- Increasing resource stock by converting wasteland, barren land into productive land through technical interventions.
- Discouraging sales of adulterated fuel in rural areas can improve the efficiency of the farm equipments and at the same time reduce agriculture sector fuel linked emissions.
- Fertilizer use management: Lower usage of fertilizers can be achieved through smarter use of soil testing, precision application and crop rotation or mixed cropping.
- Using Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) to develop underutilized and unutilized land for agriculture purposes and for maintaining water harvesting structures.

5. Initiatives by the State Government

- The State is committed to focus on proper soil management for improving crop productivity and for sustainability. GoJ is promoting soil health card scheme, which is a sub scheme of National Mission on Sustainable Agriculture aiming at Integrated Nutrient Management (INM) through judicious use of chemical fertilizers, including secondary and micro nutrients in conjunction with organic manures and bio fertilizers. As on January 2017, 44,454 Soil Health Cards (SHC) have been printed and distributed in the State covering around 3,37,636 farmers.
- State is determined to promote judicious use of fertilizer and thus plans to increase fertilizer consumption to 115 kg/ha by 2020 -21.
- The State has established Organic Farming Authority of Jharkhand in 2012. Till April 2016, 30363.73 ha of land have been certified by approved certifying agencies. State will also focus on creating appropriate market linkage mechanism for the organic produce for differential price realization.
- **Mahila Kisan Sastikaran Pariyojana (MKSP) :** The primary objective of the MKSP is to empower women in agriculture by making systematic investments to enhance their participation and productivity, as also create and sustain agriculture based livelihoods of rural women. As on December 2017, more than 46000 women farmers have been covered under MKSP.

6. Flagship Schemes for Agriculture¹

- **Exchange, Distribution and Seed Production:** provides seed for *kharif*, *rabi*, and alternate cropping in case of deficient rainfall to the farmers at a subsidized rate.
- **Agricultural Fair, Workshop, Training, Exposure, Award, Publicity & Extension:** to create awareness in agricultural activities, and thereby increase output.
- **Grants - in – aid:** Under the aegis of Department of Agriculture, different agriculture corporations, agencies and missions are functional - ATMA, SAMETI, JSADC Ltd., Seed Certification Agency, JAMTTC, JASMIN, OFAJ are such institutions.

1. Source: Jharkhand Economic Survey : 2017-18

- **Special Crop Scheme:** the scheme promotes the cultivation of thick crops like *ragi, gudgi, jowar, madua* and other pulses.
- **Single Window and mobile based e-Solution:** knowledge of efficient and modern methods of agriculture, assistance, suggestions, information, and solutions through Single Window Centres at designated areas
- **Conversion of Fallow Land to Cropped Area:** The government seeks to increase agricultural output by converting fallow and barren land to cultivable land for thick and other crops. Further, farmers will be provided with special seeds, fertilizers and encouragement amount. The plan is to be implemented in 2 lakh ha area of all 24 districts
- **Double Cropping Rice Fallow Scheme:** Rice is the primary crop in Jharkhand. After the harvesting of rice, the fields are vacant post-harvest season. Thus, the government is encouraging the farmers to grow other crops in the off- season. The secondary crops can be *dalhan, tilhan* and thick crops: *ragi, gundli, madua* etc. Secondary crops will be cultivated in one lakh hectare area. Cluster farming will be practiced in 50 hectares. The farmers will be provided with fully subsidized Zero Seed Drill Machine to ensure the success of the scheme.
- **Quality Control Laboratory:** The quality control laboratories provide necessary information and knowledge about the seeds, diseases, maintaining and enhancing the crops, and ways of increasing the productivity.
- **Ponds Reconstruction Scheme:** Reconstruction of ponds for the irrigation purpose of farmers. Ponds of up to 5 acres are to be rebuilt through machines by the Agriculture Department. The ponds which are bigger than 5 acres are to be rebuilt by the Water Resource Department. About 2000 ponds have been planned to be rebuilt.
- **Distribution of Pump sets:** The scheme aims to increase the options of irrigation among small and marginal farmers having covered with irrigation wells under MGNREGA, by the distribution of pump sets among them. The scheme is carried out through self-help groups and Farmers' Clubs. The farmers will be provided with 200 feet pipes for the irrigation purpose. About 20,000 pump sets have been distributed through the scheme.
- **Mechanisation of agriculture:** To integrate women into agriculture, the women self-help groups are established as the bank of agricultural tools and implements.

In the year 2017-18, 3500 women SHGs were provided with small but effective agricultural tools.

- **Jalnidhi Scheme:** The scheme was initiated in 2015-16 to provide the farmers with different sources of irrigation to reduce their dependency on rainfall. For this purpose, deep boring, percolation tank, micro-lift irrigation has been constructed.
- **Distribution of Agricultural tools and irrigation pumps:** The scheme intends to distribute irrigation pumps and agricultural tools which are operated through solar energy. Solar energy would reduce the functioning and maintenance costs of tools and pumps.
- **Organic Farming:** There has been a proposal of promotion of organic farming. For this, there has been an establishment of Organic Farming Authority. It has been initiated in 2017. This is a three years programme which will continue till 2019-20.
- **Interest Subvention:** To incentivise prompt repayment additional interest subvention of 3% to farmers is provided under the scheme.

7. Action Plan 2021 for promotion of sustainable agriculture practices

- i.** Speed up the process of distribution of soil health card so that all farmers comes under its purview.
- ii.** Promote balanced usage of chemical fertilizer by imparting training to farmers
- iii.** Increase the number of LAMPS/PACS for fertilizer handling and distributions
- iv.** Increase the number of private wholesaler/retailers in fertilizer business.
- v.** Reclaim 5 lakh ha acidic land by 2022; ameliorate acidic soil with adoption of proven technologies developed by the soil scientists and also distribute dolomite & lime for the same; collaborate with steel plants to supply basic slag at nominal rates for amelioration of soil
- vi.** Promote setting up of mobile testing labs by both private and public sector
- vii.** Promote organic adoption under Parampragat Kheti Vikas Yojana, which would lead to increase in soil productivity by usage of natural and organic supplements

- viii.** Promote soil and moisture conservation by way of interventions such as land levelling, bench terracing, retention terracing, field bunding, gully plugging (Upper reaches, Middle reaches and lower reaches).
- ix.** Bring additional 1 lakh ha area under organic certification by 2020-21

District Specific practices, if any, may be added.
