



## **Sustainable Development of Agriculture in Andhra Pradesh: Innovative Management Practices**

**\*Dr. S.S. Mahalakshmi, Academic Consultant, Department of Economics, Yogi Vemana University, Kadapa.**

### **1. Introduction**

After getting independence our country wanted to become self sufficient in food production. It achieved self sufficient in food production by using high yielding variety seeds/ hybrid seeds, water and synthetic/chemical fertilizers and pesticides. One may call these kind agricultural practices as conventional farming. Because of these practices the food production increased by 34 because. However farmers' income did not increase. On the contrary most of farmer's especially small and marginal farmers became indebted during the same period. This is because conventional farming requires heavy investments and also due to vagaries of whether and swings in the price fluctuations. Dependence on agriculture by the households is to the extent of 50% including causal labour and self employed in agriculture (2017-18, Periodic Labour Force Survey). Because of the above factors farmers' agitations and suicides are in the new.

### **2. Effects of Chemical Fertilizers and Pesticides in Agriculture**

Chemical fertilizers have aided farmers in increasing crop production since the 1930's. While chemical fertilizers have their place increasing plant nutrients in adverse weather conditions or during times when plants need additional nutrients, there are also several harmful effects of chemical fertilizers. Some of the harm chemical fertilizers may cause include waterway pollution, chemical burn to crops, increased air pollution, acidification of the soil and mineral depletion of the soil.

The use of chemical fertilizers on crops can have adverse effects on waterways caused by chemical run off of the excess fertilizer. The over-abundance of nutrients in the water reduces the amount of oxygen. The existing organisms living in the water use up the oxygen that is left. The result is oxygen depletion causing the fish to die.



Chemical fertilizers are high in nutrient content such as nitrogen. Over-application of chemical fertilizer to plants may cause the leaves to turn yellow or brown, damaging the plant and reducing crop yield. This condition is known as chemical leaf scorch. Leaf scorch can cause the leaves of the plant to wither and may cause the plant to die.

Excess nitrogen used in crop fertilization can contribute to the release of greenhouse gases such as carbon dioxide and nitrous oxide into the atmosphere. This effect is caused by using a greater amount of chemical fertilizer than the plants can readily absorb. According to the National Oceanic and Atmospheric Administration (NOAA) Climate Monitoring and Diagnostics Lab, excess greenhouse gases trapped in the atmosphere may be contributing to the increase of land and ocean surface temperatures.

The over-use of chemical fertilizers can lead to soil acidification because of a decrease in organic matter in the soil. Nitrogen applied to fields in large amounts over time damages topsoil, resulting in reduced crop yields. Sandy soils are much more prone to soil acidification than are clay soils. Clay soils have an ability to buffer the effects of excess chemical fertilization.

There is an increasing concern that continuous use of chemical fertilizers on soil depletes the soil of essential nutrients. As a result, the food produced in these soils has less vitamin and mineral content. According to data produced by the U.S. Department of Agriculture Nutrient Data Laboratory, foods grown in soils that were chemically fertilized were found to have less magnesium, potassium and calcium content.

Excessive use of synthetic fertilizers and pesticides has adverse affects on water bodies, soil, environment and human health which are explained briefly below:

1. Water bodies are affected by run of the excess use of synthetic fertilizers causing decreasing oxygen in the water bodies. This results in decreasing organism in the water bodies.
2. It causes leaf scorch and may results in death of the plants. It may also decrease yields
3. The pesticides become immune resulting in excess use synthetic pesticides.



4. It results in excessive release of green house gases such as carbon dioxide and nitrous oxide into the atmosphere. This results in increasing atmosphere temperature
5. It causes depletion of soil micro nutrients like minerals and vitamins and also soil becoming acidic.
6. Decreasing soil micro nutrients and excessive use of synthetic pesticides badly affects human health.

### 3. ZBNF as an Innovative Management Practices in Agriculture

To overcome the above problems some agricultural practices are suggested without using synthetic fertilizers and pesticides which are also practiced in India. Some of them are Natural Farming, Organic Farming, Zero Based Natural Farming (ZBNF) etc.,. India's Legislature is advancing natural farming in the nation from 2015-16 through the traditional agricultural development plan's committed schemes and the National Agricultural Development Plan. To achieve the promise of the central government to double the income of farmers by 2022, one factor being considered is zero budget natural farming. Prime Minister Narendra Modi has been talking about need to reduce chemical fertilizers and promotion of organic and natural farming at various forums, including the United Nations convention. Union finance as well as agriculture minister have also been talking about promotion of natural farming at various occasions.

ZBNF is advocated by an Indian agriculturist and Padma Shri awardee, Dr Palekar. Zero Budget Natural Farming (ZBNF) is a method of farming where the cost of growing and harvesting crops and plants is zero. In other words, farmers need not use fertilizers and pesticides in agriculture. It is, basically, a natural farming technique that uses biological pesticides instead of chemical-based fertilizers. Farmers use earthworms, cow dung, urine, plants, human excreta and such biological fertilizers for crop protection. It reduces farmers' investment. It also protects the soil from degradation. As both a social and environmental programme, it aims to ensure that farming – particularly smallholder farming – is economically viable by enhancing farm biodiversity and ecosystem services. It reduces farmers' costs through eliminating external inputs and using in-situ resources to rejuvenate soils, whilst simultaneously increasing incomes, and restoring ecosystem



health through diverse, multi-layered cropping systems. Cow dung from local cows has proven to be a miraculous cure to revive the fertility and nutrient value of soil. One gram of cow dung is believed to have anywhere between 300 to 500 crore beneficial micro-organisms. These micro-organisms decompose the dried biomass on the soil and convert it into ready-to-use nutrients for plants.

Essential components of Palekar model of ZBNF is based on four components. These are Jeevamrita, Bijamria, Achadana and Whapasa. To prepare Jeevamrita and Bijamrita, native (desi) cow is essential. These four components are to increase soil nutrients by increasing microbial activity and organic matter and also to protect seedlings from soil borne diseases as well as young roots from fungus. Apart from the above four components for preparing natural pesticides (Kashayams) are required to protect from pesticides. A few of the Kashayams are Neemastarm, Agniastarm, Brahmastram, Panchagvya, Dasaparni, etc., In general preparation of natural pesticides require leaves of plants and trees. Important leaves of the plants/trees used in the preparation of the these kashayams are Dhatura, dandelion, Calotropis, Gunner, Pomegranate, Guava, Pongamia, Peepal, Aegle, Tactona, thorny creeping plant leaves.

#### **4. ZBNF in Andhra Pradesh**

ZBNF is a grassroots agrarian movement and extensively practiced in Andhra Pradesh. It is a low-cost, locally-sourced natural farming method that does not rely on the use of agrochemicals and has the potential to meet the twin goals of global food security and conservation of the environment. ZBNF launched in 131 village clusters in 2016 and has since expanded to 268 clusters. To fully explore the potential of ZBNF as an agricultural strategy, empirical research is being done to understand the social dynamics and scientific processes taking place through the farming method. The Andhra Pradesh state government supports ZNBF, with the intention that 6 million farmers will implement ZBNF by 2024.

In 2018, Andhra Pradesh started a plan to become the first state in India to practice 100% natural farming by 2024. It aims to carry out chemical farming on 80 lakh hectares of land by converting 60 lakh farmers of the state into ZBNF methods. Andhra Pradesh's ambitious natural farming



programme started at mass scale and has generated a fresh interest in other states to make ambitious targets. AP government launched the project with much fanfare, but it attracted criticism too with questions over the huge funding, practical results and implementation.

Modified version of ZBNF is adopted in Andhra Pradesh. The adopted method is called Climate Resilient Zero Based Natural Farming (CRZBNF). Government of Andhra Pradesh started CRZBNF in 2015 and wants to bring entire land and all farmers under the umbrella of CRZBNF by 2024. The Climate Resilient Zero Budget Natural Farming approach, led by the Government of Andhra Pradesh's Department of Agriculture, is on target to engage 1 million farmers by 2019–2020 to increase yields and promote resilience through agroecological processes. It is a broad state policy with multiple objectives including enhancing farmers' welfare, consumer welfare, and the conservation of the environment. The work is done through farmer-to-farmer mentoring, short tutorials and films, and modern communication methods.

Vijay Kumar Thallam, advisor to the Government of Andhra Pradesh, shares that it is extremely important to take unprecedented measures to tackle global warming and climate change. ZBNF is “smart” agriculture where farmers not only enjoy the direct economic benefits but also get resilient crops, improved health due to safe agriculture practices, and consumption of chemical-free food, increased biodiversity, soil and water security, along with ecosystem regeneration.

In 2015, the Government of Andhra Pradesh (GoAP) mandated Rythu Sadhikara Samstha (RySS), a state-owned, non-profit organisation to scale-up ZBNF practices to cover all six million farmers and eight million hectares of agricultural land in the state by 2024. In the face of agrarian distress, the programme aims to promote climate-resilient, chemical-free, ecological agriculture and provide small and marginal farmers with profitable livelihoods from agriculture. The programme was launched in 2015–16 and its implementation in the field started in 2016–17. As of July 2019, more than 500,000 farmers have enrolled in the programme across all 13 districts in Andhra Pradesh, covering an area of around 204,000 acres. The implementation of this project at scale could help India make significant progress towards almost a quarter of 169 SDG targets as outlined (**Tripathi et al.** 2018).

According to the Andhra Pradesh government, as of March 2020, 0.62 million farmers (10.5 per cent of all farmers) were enrolled in the programme. Of the enrolled farmers, 0.44 million



farmers (7.5 per cent), were actually practising natural farming on an area of 0.45 million acres, which works out to 2.9 per cent of the net sown area spread across 3,011 gram panchayats. In this regard, State government will spend Rs 304 crore on the project, which is aimed to cover 2.39 lakh farmers in around 600 village panchayats and promote natural farming in Andhra Pradesh.

## 5. Central Government initiatives to support ZBNF:

Government of India has been promoting organic farming in the country through the dedicated schemes of Paramparagat Krishi Vikas Yojana (PKVY) since 2015-16 and also through Rashtriya Krishi Vikas Yojana (RKVY). In the revised guidelines of PKVY scheme during the year 2018, various organic farming models like Natural Farming, Rishi Farming, Vedic Farming, Cow Farming, Homa Farming, Zero Budget Natural Farming (ZBNF) etc. have been included wherein flexibility is given to states to adopt any model of Organic Farming including ZBNF depending on farmer's choice. Under the RKVY scheme, organic farming/ natural farming project components are considered by the respective State Level Sanctioning Committee (SLSC) according to their priority/ choice.

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