

Crisis in Modern agriculture

After 40 –50 years of the introduction of the chemical farming, in various places the farmers are struggling to get success in agriculture. They are also facing several problems due to pest and diseases. As a technology it has been good and improved after few years of introduction, by rectifying all the shortcomings, but in contrary the chemical farming technology is giving troubles as days go on. It indicates that the technology is not a good one for a long term application. Henceforth it is worth to analyse the modern chemical farming systems and methods. It can be done at various levels such as genesis, agrochemicals used (fertiliser, pesticides, fungicides, acaricides, herbicides, etc.), farm design & management and soil fertility managements.

In 19th century, a scientist Justus Von Liebig gave the concept of replacing the nutrients that are deficient in the soil by means of some minerals and altering the nutrient status of the soil based on the crops need. Moreover he identified that the nutrients that are responsible for a particular symptom in the crops and suggested that it can be rectified by the application of that specific nutrients in the form of minerals. Later on before he died he himself realised his mistakes and has stated that he tried to conquer nature and alter it without understanding its complex chain of natural phenomenon that are helping each other.

Similarly in 1970 Nobel price winner and father of Green revolution has also stated that “Green revolution is only a temporary and not a permanent solution”. If we trace the genesis of the chemical farming, after the II nd world war in 1945, the chemical (nitrate) used for making bombs were converted into nitrogenous fertilisers. When the fertilisers were introduced the farmer’s didn’t accept it, but it was forced into their practise. During the II nd world war the DDT was used by the army to eradicate malaria that was affecting the soldiers. Meanwhile in the chemical war against Japanese the DDT and Aldrin were used. After the war instead of closing those factories they thought of using the chemicals in the farmers fields against insects and fungus, without analyzing their long term impact on soil, ecosystem, humans and animals.

Rachel Carson found out that the DDT is responsible for the extinction of the American “Bald headed eagle that made the eggshell thin, so the eggs were broken before they were hatched. She has stated that ***“Man is a part of Nature and his war against Nature is a war against himself”***.

Due to the introduction of several agro chemicals in the soil the organic nutrients cycles were hindered and the self-sustainable nature was spoiled. In the name of Green revolution the

chemical farm inputs like fertilisers, pesticides, fungicides, herbicides, etc were introduced with the focus of having a single benefit of increasing the yields of the crops, to solve the problem of insufficient food supply of those days. Scientist & other planners have failed to consider the long term affect of the chemical inputs in the soil & the environment. Lately even after realizing the ill effect of these inputs, Scientist & administrators were forced by the big chemical industries to carry out researches & extension works in the same line covering the ill effects. Whatever the case may, it is difficult to cover the ill effect for a long time. Fortunately very soon, farmers started realizing the ill effect in the soil & crops.

In stead of approaching the problem of low yield in a holistic manner with broader perspectives, Scientist & planner had focused only in Chemical inputs by sacrificing the fertility of the soil & the quality of the products. It is critical for everyone doing chemical farming to understand the ill effects of chemical inputs and their multi-faced influence over environment (Soil, Water, etc), Human beings, animals, birds & microorganisms in the soil & the quality of the produces. As a result of the usage of Chemical inputs, the cost of cultivation has increased several new pest attacks & disease incidences are increasing in every crop, nutritive quality of crop produce is declining, shelf life has reduced & heavy pesticide residues are remaining in the food material.

We can analyse the problems created by the chemical inputs one by one. The fertilizers have greater impact over the soil. It destroys the beneficial microbial flora & fauna of the soil & so the harmful pathogens are developing. Since microorganism are not visible to the naked eyes, farmers are not able to realize the destruction of it. They have several roles in the soil fertility to maintenance. The microorganisms can fix up nitrogen & other nutrients from the atmospheric air to the soil. Similarly they can release the fixed nutrients in the soil for plants use. Above all, they are very critically needed for decomposition of all organic materials added in the soil. By decomposition they release the nutrients. They are also essential for the formation the Humus.

The multiplication rate of the microorganisms is very high. So, if we can inoculate different beneficial micro-organisms in the soil & can provide favorable conditions, they will proliferate very fast and can help us in increasing the soil fertility.

There are some microorganisms in the soil, which can produce growth hormones that will definitely increase the growth yield of the crops grown. All the chemical fertilizers are of waster soluble in nature. There is a heavy loss of fertilizer by leaching, fixation & volatilizations.

Especially, the loss of nitrogen fertilizers is more. If we apply 100 Kg of N in single application, the utilization by the crops is maximum 20%, the rest is all lost/ wasted.

The Manurial schedules admit the loss of fertilizers by different ways. It is a criminal waste of money by this sort of loss of fertilizers. To increase the utilization, attempts were made by advising the farmers to go for split doses of the suggested quantity of fertilizers. Even after practicing for three split doses, it is not possible to increase the use of efficiency above 40%, so the farmers & the real scientists have to think about this wastage.

Moreover the availability period of these salt fertilizers are less than 25 days after their application. In case of dry place, sandy soil and heavy rainfall areas the available period is still low. By this, the long duration crops are made to suffer due to lack of nutrient in between the fertilizer applications. Meanwhile due to quick release of nutrients the crops are forced to have more intake of particular nutrient within a short span of time. The unbalanced supply of nutrients to any crop will lead to an unbalanced, soft & succulent growth that invites the pest & diseases. By the application of unbalanced nutrient we are creating the problem of pest & diseases and then trying to solve it with the help of different toxic chemical pesticides & fungicides. To reduce the quick release of nutrients from the applied chemical fertilizers, efforts were taken to have slow release by means of Tar-coated urea, neem-coated urea etc. Apart from the above said ill effects of chemical fertilizer application, it is highly determined for the earthworms the so called "Friend of the farmers". The farmers have turned to be like an enemy of the earthworm that helps him in several ways. Yes, primarily it helps to digest the biomass & animal waste added into the soil and convert them into valuable vermicastings. The other indirect benefit that we receive by its presence is through its burrowing action. Daily it moves up & down in the soil creating tunnels. These tunnels increase the porosity of the soil, in other words the bulk density of the soil increases. Due to this

a) The drainage capacity of the soil increases

b) The rate of gaseous exchange will be more

c) If we take any plant, there are few important activities. Photosynthesis & transpiration are the important activities above the soil in the shoot region of a plant. Similarly respiration is another important activity that takes place below the soil in the root region of any plant except hydrophytes.

The increase in the gaseous exchange of soil through the tunnels created by earthworms will help the plants to have more respiration resulting in good real growth. It is obvious that the increase in root growth helps the crop for more uptakes of nutrients & water. This will definitely increase the growth of any plant. If a crop has deeper root system, it can escape the drought condition for a long period of time.

The fertilizers that are leached out through irrigation & rainfall contaminate the water ecosystem (Surface & underground). The ill effect of water pollution is well known to affect the living organism that lives in the water bodies. If human consumes the polluted water with more nitrates it affect the nervous system, limb joints of adult and the brain development of the infants at the womb of mothers.

Man have started using the chemical inputs in agriculture to increase the yield for the betterment of humans, but indirectly it is final affecting the human health. Should we need to continue this sort of act to kill ourselves and the environment we live?

Next let us see the influence of the pesticides, fungicides, accaricides & molluscides . These chemicals belong to different group of toxic chemicals. These chemicals were initially used to kill the insects, fungus, nematodes & mollusks respectively. Do they become harmless after the decided action is over? No they posses the capacity of killing the targets for 15-20 days only, after that they became harmless to the decided targets. But they stay in the environment as different derivatives that are harmful for other living being in the soil, water, animal & humans, for minimum of 2-3 years. Some chemical have long residual effect for even up to 8 years.

Especially DDT & BHC are having their half shelf life as 20-25 yrs. During their presence in the soil & water it enters into the "food chain & food web ". So the accumulation of these toxic chemicals takes place at different levels of the ecosystem, affecting the non targeted living organisms. Through research some strange facts are released explaining the sequential effect of the use of the toxic agro inputs. One such fact is that DDT & BHC are found in mother's milk, which should be the purest form of food for babies. It has been revealed that the chemical residues in the food we take get accumulated in the adipose layer below our skin. This accumulation of different toxic chemical give way for giddiness, allergies, nerve disorders, skin cancer etc. In addition, my personnel experience in 1994 at Kurinji farms was, an analytical report revealed that the dehydrated mango was having 0.011 ppm gamma BHC, which was used in 1986 - 1987 against

termites at the young seedling stage of the mango tree. So after 7 - 8 yrs BHC is seen in mango fruit.

At field level it is pretty to see the person spraying these toxic chemicals are drenched by these chemicals by walking against the wind flow. During rainy season these chemical are polluting the water ecosystem. By wind drift non targeted organisms & human are affected badly. The agrochemicals that are used for seed dressing, tuber dressing, corm dressing, soil drenching & killing weeds (Herbicides) will have the effect of both fertilizers & pesticides sprayed.

Another aspect of these agro chemical is, they are not able to provide a permanent solution to the problems. In chemical farming, we are treating the symptoms rather to find out the causes & rectifying it. Whereas, in organic farming the causes of the problems are addressed to have a long term solution. We can compare this with the medical systems for human being. In allopathy the symptoms are treated, whereas in Ayurveda, Sidha & Homeopathy the cause is treated to have permanent cures.

In terms of economy, Chemical farming leads to draining of our economy to few multi-nationals. Previously we were directly ruled by foreigners, now they are indirectly reeling our farmers "Neo Colonism".

The other tragedy of the chemical farming system is the dependency of farmers for seeds. Seed saving was our heritage, which we have totally lost and we are with the begging bowls for seeds. Seed is one of the very important components for a successful farming. The new hybrids are produced with the focus of high yield, with poor pest & disease resistance & highly response to fertilizers. Use of this sort of seeds will definitely lead us to the use of all agro chemicals.

In farm design & management we have shifted our farming system from mixed cropping (Poly culture) to monoculture in orchards. In annuals the crop rotation practice that regulates the pest attack, disease incidence and nutrient management in the soil has been neglected.

The important practice of maintaining the humus and organic carbon level in the soil by means of green manuring is not under practice. The farm waste and other biomass generated in the farms are burnt in the field itself with out understanding the use of it. They are actually good materials for mulching, compost making and vermicompost. The burning of biomass releases abundance of CO₂, the real root cause for "Global Warming". At the site of burning, it destroys all the build-in organic carbon, beneficial micro organisms and earthworms. Similarly feeding the

crop through the soil and maintaining the fertility of the soil by the addition of compost has come down.

The mixed farming that involves animal husbandry, piggery, poultry and fishery was totally made impossible with the present day "industrial farming system". The new approach of farming as "Precision farming", wrongly motivates the farmers towards chemical farming methods, highlighting the cost-benefit ratio in short duration.

The introduction of Genetic Engineering / Modification as a new plant breeding technique is another threat to the farming and to the biodiversity as a whole. This new technique is altering the genetic make up of the plant species. It has been commercialized before analyzing it properly for its long term impact over the ecosystem, humans & animals. The varieties produced by this technique requires full assistance by chemical inputs and cannot grow in a natural condition. The seeds produced from successive generation are not suitable for future use as seeds. It forces the farmers to fully dependent on the company seeds supplier. While farming the normal plants and transgenic plants if cross pollination takes place with the pollen grains of transgenic plants it is likely to alter the genetic sequence of the normal plants. As a consequence several unknown type of genotypes can emerge in the years to come. It creates an uncertainty in the gene pool of a species. Some researchers are using this technique in an unethical way by crossing plant genes with animal genes. This is creating unknown type of proteins, fats, etc for human consumption. New varieties has been developed by incorporating the genes of *Bacillus thuringiensis* to work against borers. Due to this there is a chance of developing stem borers with resistance to this sort of transgenic BT varieties. If it happens it is very difficult to control that sort of new insect strains even by any strong chemicals.

On seeing the above said wrong practices it is very clear that the focus of farming has been fully shifted / changed by adopting methods with short term benefits. The intension of highlighting all the drawbacks of modern chemical farming system is to create the awareness among the farmers to choose the correct technology that has long term benefits. If people with open mind can realize the drawbacks of the existing farming practice it is very much possible for them to reorient the farming activities aiming for long term benefits & to do it in a sustainable way.