

LEARNING FROM THE KERALA FLOODS OF 2018: HOW EXTENSION AND ADVISORY SERVICES COULD SUPPORT FARMERS TO DEAL WITH NATURAL CALAMITIES



The unprecedented floods of August 2018 adversely affected Kerala's agriculture. Rema K Nair, in this blog, reflects on how extension services came forward to support farmers to deal with the flood damage to crops, and how it is currently supporting farmers to deal with its long-lasting impacts.

CONTEXT

Kerala witnessed an unprecedented flood last August that critically affected the lives of people belonging to every walk of life. It goes without saying that farmers were the most affected as their houses and livelihoods were completely lost. It is estimated that an area of around 57,000 ha with standing crops of various types were lost in the deluge. Apart from the loss of machinery, farming implements, harvested and stored produce and damage to warehouses, irrigation channels etc., the incalculable loss of top soil and soil nutrients, are almost always overlooked.

Kerala floods: August 2018

With the exception of 1924 and 1961, in the last 118 years Kerala received the highest amount of rainfall in 2018. From May to August the State received rainfall that was 53% higher than normal, and all dams were almost full at that time. The incessant rains in catchment areas of the dams turned the situation into a nightmare. Kerala received a rainfall of 254.2 mm in just three days in mid-August. All these factors together created the greatest catastrophe in the history of Kerala. Landslides and cloudbursts were reported from several districts. The floodwater receded only after one week. Lots of silt, sand and other debris got deposited in many of the fields and in some places it was not possible to clear such fields manually.

Impact on farms

Crops worth more than INR 5600 crore were lost, affecting around 400,000 farmers. Approximately 150,000 ha of cropped land was affected. In August most of the flooded fields remained inundated for eight to ten days. The weight of 1 m³ of water is around 1 ton, and this water remained above the soil to a height of about 2 to 2.5 m. That means around 2 to 2.5 tons of mass exerted pressure over the soil making it compact. This made the soil impervious to air, and under anaerobic conditions the respiration of roots was affected. Plants, therefore, failed to take up water, and as a result once the floodwater receded the crops appeared to have completely dried up.



The nutrient status of the deposited soil varied from place to place. Nutrients, such as nitrates, and potash, along with micronutrients were washed off from the topsoil, especially from places at a high altitude. Some of these were partially deposited near banks and the rest had washed away into the sea. Under anaerobic conditions mostly pathogenic microbes flourish, whereas beneficial microbes, such as Vesicular Arbuscular Mycorrhiza (VAM) and Trichoderma, cannot survive. Gases such as nitrous oxide methane, and carbon dioxide, which are produced under flood conditions, accelerate the decay of roots. Anaerobes make use of these gases and grow. Most of the soils in Kerala are acidic. The post-flood analysis of soil has confirmed that acidity has increased several folds. This further creates problems in nutrient assimilation by soils. Loss of soil micro flora and macro flora, like earthworms, ants, etc., is a very serious problem that needs to be addressed urgently.

Box 2: Impact of the flood on crops

Rice being a semi-aquatic plant could survive inundation, especially during the vegetative phase. However, crops at the flowering stage were seriously affected. The grains were partially filled and the appearance and acceptability of the grains were affected.

The major commercially important varieties of bananas, such as *Nendran* and *Poovan*, were completely destroyed. It is to be noted that varieties of *Palayankodan* and *Njalipoovan* survived the flood. But spices like ginger, turmeric, and pepper could not withstand the flood, and all vegetables were completely lost. Nutmeg seedlings below 5 years failed to survive, whereas older plants could be saved with proper care.

Coconut seedlings were lost in the flood but adult palms were generally unaffected. The impact of flood on all perennial crops and trees are yet to be completely understood. There are chances of occurrence of new diseases. It is to be noted that the root disease of coconut was first noticed in Kerala at *Erattupetta* after a major flood.

Incidence of pests was another major problem. Post floods, attack of *Spodoptera* (Armyworm) was seen severely on all crops, like paddy, vegetables, and banana. Timely scientific intervention successfully controlled the attack. *Alternanthera spp*, *Cyperus*, and other grassy weeds are seen growing wild in many places. A change in weed flora was also noticed.

EXTENSION'S RESPONSE TO THE FLOODS

Dealing with the damage

Our first concern was how to protect the lives of farmers from a likely epidemic of leptospirosis, a distinct possibility due to a rise in the rodent population as a result of floods. The immediate response of the extension staff, especially of the State's Department of Agriculture, was to inform farmers on the need to take doxycycline as advised by the Health Department.

Flood debris were removed by the farmers themselves. In places where the quantity of debris was too high, farmers were given assistance to the tune of INR 12,500 per ha. In several places, government agencies like Kudumbashree (<http://www.kudumbashree.org/>) were engaged in de-silting activities. Support from schemes such as MGNREGS were also used to implement these activities.

On a war footing extension functionaries visited each and every farmer to assess crop loss. This helped the farmers to get government aid at the earliest. During the visits individual farmers were given instructions on how to save their remaining crops, and how to get income from their fields.



Farmers were advised to plough the topsoil so as to open up the soil's pores and allow the soil to breathe. This was essential to prevent the formation of hard impermeable aggregates that could affect soil aeration further. The silt and clay that was deposited above the topsoil was broken down by the farmers and mixed with the soil.

As regaining soil health was vital to restart agriculture, soil test campaigns were conducted in almost all panchayats to know the nutrient status of soil. In several places water-soluble nutrients, such as potash, calcium and magnesium, got dissolved and leached into the water. Soil acidity had increased considerably in most of the soils. Dolomite, gypsum, slaked lime and other soil ameliorants were supplied to farmers at a subsidised rate to regain soil health.

Farmers were encouraged to enrich the microbial activity in soil by ploughing in lots of green matter, farmyard manure and compost. Adding paddy husk was also adopted by farmers as this too can help in improving soil aeration. Moreover it adds to the silica content of the soil.

Beneficial microbes like Trichoderma, and VAM, were supplied to farmers to enhance the population of helpful microbes in soils that can aid in root growth and nutrient uptake. On-farm multiplication of VAM and Trichoderma was taken up as a front line demonstration in progressive farmers' fields. These microbes help in control of soil-borne pathogens as well.

Cultivation of cover crops, especially leguminous crops, is promoted wherever possible as it will help in adding more organic matter to the soil and thus improve soil aeration and moisture retention as well as nitrogen fixation. Seeds of these crops were supplied to farmers.



Farmers were advised to allow the growth of naturally occurring weeds as they have a deep root system that can improve soil porosity. They were also encouraged to adopt mulching of soil with organic matter, such as dried leaf and crop residues as this helps in moisture retention, ensure soil porosity, and improve microbial activity.



Short duration vegetable crops particularly amaranthus and cucurbits – can help the farmer to get some income immediately after the flood. So seeds and seedlings of these crops were supplied to farmers free of cost.

Extension staff convened campaigns under the title *Punarjani* (meaning 'rebirth') on the worst affected farmer fields to clear the debris, and add soil ameliorants. Seeds and seedlings were planted in these fields by extension staff.



Building resilience

The Department of Agriculture Development & Farmers' Welfare (Kerala) had launched a crop insurance programme a few years back. But farmers were reluctant to spend the initial premium even though it was nominal. But the floods have changed their attitude. Farmers currently recognize the importance of insurance as these types of unpredictable calamities and crop damage are likely to increase due to changing climate. Wide publicity is currently being given to the crop insurance scheme so that farmers can take up agriculture confidently. More farmers are currently approaching the extension staff to help get their crops insured.

Under the leadership of the Agricultural Technology Management Agency (ATMA), farm schools, farm field schools, capacity-building meetings, *kisan gosthis* were conducted in all panchayats to popularize scientific intervention in agriculture and allied fields. Apart from this, since a lot of nutrients were lost in floodwater, we are carefully assessing nutrient deficiency symptoms.



Crops like pepper, nutmeg, and other spices need a comprehensive package for rejuvenation. Perennial crops also need periodical surveillance given the incidence of new pests and disease. Under the crop health programme, extension staff are deployed to keep a vigil on the occurrence of pests and diseases.



Farmers are also being encouraged to take up additional activities, such as fisheries, animal husbandry, and value addition so as to ensure a steady income.

END NOTE

Despite this staggering calamity agriculture continues to be the biggest employment generating sector in Kerala even today. So the revival of this primary sector is vital in rebuilding Kerala in the post-flood scenario. This would necessitate more coordinated efforts from the Kerala Agricultural University and the State Department of Agriculture Development and Farmers Welfare. The greatest challenge facing the extension community is how to cope with the unpredictable situations that will continue to develop as a result of climate change.

It's high time that we shift to crops that demand less water and have high water use efficiency. Moreover, wetlands and paddy lands play the most important role in containing floodwaters. Deforestation in the hills and unscientific cultivation of soil-eroding crops on slopes have to be checked in order to increase the soil binding capacity and water retention. Simultaneously, the remaining wetlands and paddy fields have to be preserved through flood reservoirs that can avert loss to people and their belongings. Stringent action has to be taken against those who violate existing wetland preservation laws.

The crop insurance scheme has to be revamped to suit each agroecological zone. Agroecological zones – coastal, plains, hilly – have to be differentiated based on their soil and climatic characters. Based on the special features of each agroecological zone suitable crops and cultivars are to be identified. An integrated farm-based approach will be helpful in increasing farmers' incomes and reducing the associated risks instead of a crop-based approach that's being adopted now. Certain varieties of spices, such as pepper, nutmeg, ginger and turmeric, showed significant abilities to withstand adversities. Studies have to be conducted to identify and multiply these varieties.

Disaster risk reduction has to be included in the curriculum, not only in agriculture but in allied sectors as well, as we envisage a change in climate that would trigger cyclones and storms more often. Training is to be imparted to extension officials using national level training agencies, like the National Institute of Agricultural Extension Management (MANAGE), and it has to be ensured that the knowledge imparted through such trainings percolate down to target groups.

Agriculture should be the main focus of efforts at rebuilding Kerala as the floods have proved beyond doubt that food is the most important commodity for human survival. "Annadatha Sukhibhava". Therefore, society has a grave responsibility to ensure the well being of the farming community.

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