

Disaster Management Practices for Banana, Turmeric and Tropical Tuber Crops

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Abstract—Agricultural production in India is dominated by small and marginal farmers and it is largely dependent on climate, particularly the seasonal and annual rainfall. The frequency and intensity of extreme weather events like drought, flood, heat or cold wave, cyclone, delayed or early onset of monsoon, long dry spells, early withdrawal of monsoon, floods in drought-prone areas and drought in flood-prone areas and increased pest attacks have been increased during the last two decades due to the global climate change effect. Of the total area in the country about 8% is cyclone prone and 68% drought prone. It is estimated that the flood-affected area has more than doubled from about 5% (19 million ha) to about 12% (40 million ha.) in the past five decades.

Damage due to water stagnation depends on the age of the crop, soil texture and duration of stagnation. In Banana flood injury is usually greater when intense sunlight and warm weather follow flooding. Water stagnation at early stages for more than four days leads to complete loss in Banana,

Elephant foot yam and Turmeric. Hence, for the rejuvenation of affected crops, there is an urgent need to emphasize preparedness as a mitigation strategy to face the impact of these calamities by following the suggested management practices.

1. INTRODUCTION

The review of effects of excessive soil water during floods on performance of different crops indicates that in areas where temporary flooding hazards are expected during the growing season, crops can be selected on their relative ability to tolerate excessive moisture. In most instances, crops are more sensitive at their early developmental phase than at the later stages in terms of yield. Soil management practices like ridging and furrowing or making raised beds before planting is recommended. In addition, amelioration with foliar application of chemicals like nutrients, growth hormones and fungicides is also recommended to overcome nutritional deficiencies, hormonal imbalances and disease infections. Every effort of amelioration should be exerted at the earliest opportunity, since water damage to crops becomes more severe with longer flooding duration. Similarly heavier winds

with more than 70kmph can cause severe damage in crops like Banana and other horticultural crops.

2. MATERIALS AND METHODS

Flood affected areas in Andhra Pradesh were surveyed and the respective management strategies under such conditions for the revival of the crops, Banana, Elephant foot yam and Turmeric are discussed here under.

3. DISCUSSION

3.1 Banana

Despite high water requirement banana severely suffers from oxygen starvation of roots due to water logging. Oxygen deficiency for more than six hours results in root tip death, which in turn leads to branching of roots (Simmonds, 1966). Banana plants are also susceptible to strong winds, which can twist and distort the crown, and in extremes, uproot whole plantations especially after heavy rains.

3.1.1 Flood Damage

Fairly good drainage is known to be an essential condition which favours growth of banana crop. Waterlogging (which often occurs due to sudden heavy down pour and breaching of tank or irrigation canal bunds) is detrimental to the growth and productivity of banana. Flood damage in banana was found to be highly variable and depends on the cultivar and phenological stage of the crop duration and level of submergence. In addition to edaphic factors like soil texture and topography. Karpura Chakkerakeli (AAB, Mysore) tolerates waterlogging as compared to other cultivars viz. Tella Chakkerakeli (AAA, Unique), Robusta, Grand Nain and Dwarf Cavendish (AAA, Cavendish) and cooking banana cultivars (ABB, Bluggoe). Plants below three months old are submerged completely and hence suffer more than taller older plants. Submergence even for shorter duration was found more

damaging than waterlogging for longer duration. Stagnant water for two days caused reduction in rate of further growth and severe stunting and the prolonged waterlogging for more than 3-4 days, results in death of plants. Flood affected plants produce higher proportion of water suckers to sword suckers. Flood injury is usually greater when intense sunlight and warm weather follow flooding. Flood/waterlogging predisposes plants to rhizome or foliar diseases like rhizome rot and Sigatoka or Cladosporium speckle which either decrease the vigour of moderately affected plants or hasten the death of severely affected plants.

- When banana crop is 2-3 months old and if the plants submerge completely in water, the plants will die. Then the fields should be allowed to dry and subsequently planting of banana or any other crop may be taken up. To reduce gestation for income short duration intercrops like beans may be grown in newly planted banana fields.
- In fields where the water stagnated for about two days, the water should be let out from the fields by digging trenches between rows of plants along the gradient to facilitate quick drainage and aeration of roots. For rejuvenation of affected plants foliar spray of potassium nitrate @ 5g/l of water along with adhesive is recommended 3 to 4 times at an interval of 6 - 7 days. Once the fields are partially dried a booster dose of 100 g urea and 80 g muriate of potash (MOP) / plant followed by light irrigation should be applied twice or thrice at an interval of 20 days. Subsequently, as per requirement irrigation may be given at 7-10 days interval depending on the soil type and season.
- When the crop is at shooting and bunch development stages and if stagnation of water is for more than five days, foliar spray of potassium nitrate @ 5 g/l of water along with sticking agent is recommended 3 to 5 times at an interval of 8-10 days. In between these foliar sprays, micronutrient spray also should be given for getting normal growth and yield.
- Bunches beyond three quarters maturity in flood affected crop should be harvested and marketed to prevent premature ripening and rapid spoilage due to decay.

In flood affected banana fields, Sigatoka leaf spot intensity is likely to increase. Spraying Propiconazole @ 1ml/l of water is recommended to manage the disease.

3.1.2 Wind Damage

Wind depending on its velocity and in combination with other factors causes variable damage to banana plants. Effects may range from leaf shredding to total felling of the plants. Moderate winds in either hot weather or coupled with heavy rain will cause leaf shredding. Heavy winds for more than 40 kmph during cyclones or summer gales lodge the banana plants of taller cultivar Karpura Chakkerakeli. Similarly, in case of banana cv Martaman and Kovvur Bontha (cooking), if

the wind velocity is more than 60 kmph followed by heavy rains, then uprooting takes place. Damage is more at post bunching stage of plants. Dwarf Cavendish can withstand winds up to 70 kmph but suffers more because of leaf shredding at lower wind velocities.

For optimum yield at least 10 - 12 leaves at flowering and 6-9 leaves at harvest are required. Shredding accelerates drying of the severely torn leaves and may account for about 33% yield loss due to reduced photosynthetic efficiency and disruption in translocation of photosynthates to the bunch (sink). Planting of wind breaks will mitigate the loss to some extent.

If the pseudostem is broken due to heavy wind currents, mature bunches, if any, have to be harvested and half mature bunches should be covered with banana leaves for protecting from sun scorching until their maturity. If gardens before bunch emergence are fallen by wind or gales, mattacking of pseudostem of mother plant at the point of breaking and leaving a robust sword sucker of uniform age possibly on one side in all the mats should be done for taking up ratoon crop.

3.2 Elephant Foot Yam

Water stagnation at an early stage (2-3 months) of the crop for more than four days leads to the complete loss of the crop. In partially affected fields, immediate draining out of excess water and spraying potassium nitrate @ 0.5 % twice or thrice at weekly intervals should be done to revive the crop. After partial drying of soil, booster dose of fertilizer should be applied. Flood damaged *Amorphophallus* crop of above five months age should be harvested and partially filled tubers marketed as early as possible for vegetable purpose since the corms from the affected crop may rot quickly and cannot stand in storage. Partially affected *Amorphophallus* crop is likely to be affected by collar rot and leaf blight diseases since the conditions are favourable for their prevalence. Drenching the soil at base of the affected plants and neighboring plants with Bordeaux mixture 1% should be done immediately after draining out of water from fields. To manage leaf blight disease copper oxychloride (COC) @ 0.3 % on young crop and Metalaxyl 8 % + Mancozeb 6.4% (Ridomil MZ-72) @ 0.2% on crop above 4-5 months age should be sprayed.

3.3 Turmeric

Damage due to water stagnation depends on the age of the crop, soil texture and duration of stagnation. If the water stagnates for more than four days in turmeric fields, there will be total loss of the crop and in such cases the existing crop is uprooted.

Wherever possible immediate letting out of water should be done. In case of partial damage, potassium nitrate (5g / liter water) spray is recommended twice or thrice at weekly intervals to revive the crop. As a booster dose, 50 kg Urea and 40 kg MOP per acre followed by light irrigation is recommended after partial drying of soil. When the crop is submerged for a few hours or suffers from water stagnation

one to two days, the crop exhibits iron chlorosis which can be corrected by spraying 0.5% ferrous sulphate + 0.1% citric acid and 0.3 % Zinc sulphate twice at weekly interval.

Excess moisture and relative humidity predispose plants to rhizome rot and foliar diseases. For managing the rhizome rot disease, drenching of COC 0.3% or 1% Bordeaux mixture is recommended along with application of Neem Cake @ 250 kg / acre at the base of the plant. Spraying of Metalaxyl 8 % + Mancozeb 6.4% (Ridomil MZ-72) at 2 g/l once will limit damage due to rhizome rot once the disease incidence is noticed. For managing foliar diseases (leaf spot and leaf blotch), spraying of propiconazole or tridemorph @ 1 ml/ of water twice at weekly interval should be done.

3.4 Acknowledgements

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3.5 Conclusion

The integrated package of practices to reduce hazard impacts on Banana and other crops like Elephant foot yam and Turmeric aims at protecting the highest possible percentage of harvest from being spoilt by Floods, winds or washed away by, thus ensuring people's income and their livelihoods.

REFERENCES

- [1] Simmonds, N.W., *Bananas*.1966.2nd edition, Longman's,Green & Co, London.pp 512.