

Polybag maize silage as mitigation strategy for green fodder shortage during recurring flood events in Bihar

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Livestock not only plays a pivotal role in rural economy through employment generation but also contributes to 25.7% of agricultural GDP in India (Anonymous, 2017). India is the leading milk producer but Indian dairy sector facing hurdles like low productivity of animals, insufficient availability of quality green fodder and fodder seeds *etc.* (Singh et al., 2018). Feeding cost accounts for 70-75% of the total variable cost of dairy farming signifying the economic viability of milk production depends upon the management of feed and fodder sources as per their prices. Furthermore, straws and stovers (dry fodders) are less nutritious whereas concentrates are not economical (Patil *et al.*, 2019). Further, 44% of the feed and fodder cost of milch animals is accounted for green fodder (Kaur *et al.*, 2012). As per the estimates of Indian Council of Agricultural Research-National Institute of Animal Nutrition and Physiology, there was a deficit of 26% green fodder during 2015 which is expected to rise to 40% by 2025 (Parmar and Misra, 2020). Hence, putting efforts for enhancing the production and productivity of fodder crops will enhance the availability of green fodder thereby reducing the cost of feeding and ultimately improving the profit margins of dairy farmers. But adequate supply of green fodder throughout the year is a challenge especially during the lean period (April-June and November-December). Further, natural calamities like drought and floods also pose challenge to year round availability of green fodder (photo 1). Hence, conservation of fodder either as hay or silage is the need of the hour.

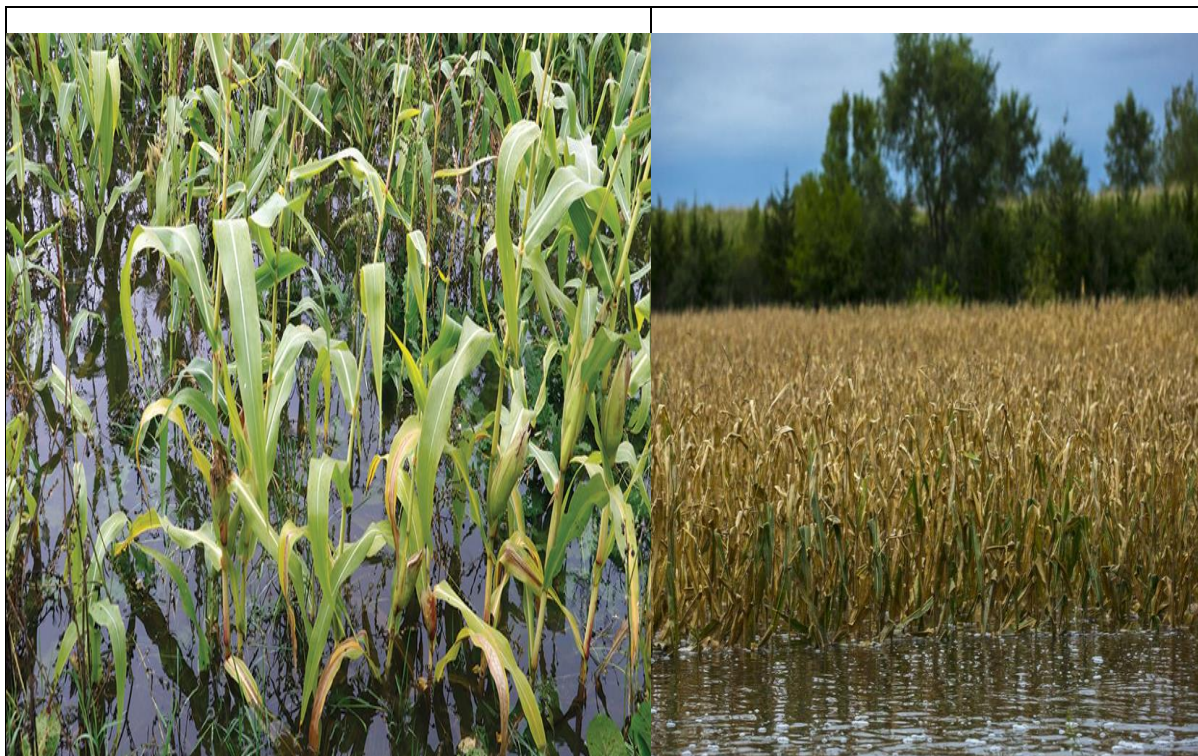


Photo 1: Maize under water logged due to heavy rain in RPCAU, Pusa Farm

Silage is the fodder which is conserved by reducing pH through natural anaerobic fermentation and is used for feeding during scarcity period, drought or floods and for utilizing surplus forage. The suitable crops for silage making are sorghum, maize and oat *etc.*

The objective of silage making is to preserve a high quality feed by fermenting forage with minimal expenditure, yield loss, and nutritional loss. Silage has more advantages than hay making as it preserves more nutrients and is not affected by weather. Feeding silage has been found to maintain livestock productivity during lean period. Different methods of ensiling like tower, pit and trench silos are in use but trench silo is economical under average Indian conditions (Patil *et al.*, 2019). Cement concrete or brick lined trenches are durable and seepage proof. However, the high capital investment for construction of silos and high labour requirement for ensiling has limited its adoption by resource poor farmers.

Polythene bag/little bag silage (Photo 2) is a novel technique for silage making for small holder farmers in developing countries who do not have access to tractors and forage harvester (Reiber *et al.*, 2009). It is unique because of lower requirement of initial investment and labour requirement. Here chopping and compaction can be done manually.

Moreover, it is flexible in handling and feeding can be done according to needs. It is marketable because of ease in transportation and the risk of aerobic deterioration during the feeding period is reduced (Reiber *et al.*, 2009).



Bihar is India's most flood-prone state. Around 76% of the total population of North Bihar faces the threats of recurring flood devastation. These floods devastate thousands of human lives apart from livestock and assets worth millions. Due to recurring flood devastations, North Bihar which is already deficit in fodder face critical shortage of livestock feed. The condition further aggravates during flood time when the demand for livestock feed rises many fold and hence price negotiations are driven by the exigency of demand (Singh *et al.*, 2013).

Maize is grown in an area of 0.67 mha (7.06% of India) with production of 2.42 million tonnes (8.44% of India) with an average productivity of 3.62 t ha⁻¹ (Anonymous, 2019). Hence, corn silage can be made easily by farmers which can be utilized during period of floods or lean season.

Preparation of maize silage in polythene bag

Fodder maize can be harvested when the grains reached the milk stage and can be chaffed to a size of 1 inch. Care has to be taken that the moisture of chaffed maize fodder was around 60-65%. A useful field technique to check the moisture level is the squeeze test. In this method, handful of chaffed fodder is squeezed in the fist for about 30 seconds. Lump formation, with moisture between the fingers, indicates excess moisture (> 65%). Absence of lump formation with chaffed fodder crumbling from the fist and lack of wetting between the fingers indicates correct moisture (60-65%). This is fit for silage making. Chaffed fodder to be poured into the polythene bag; mixture of jaggery and salt in water to be sprinkled over each layer of one foot to enrich silage. For 1 ton of chaffed green fodder, 2 kg of jaggery and 1 kg of salt has to be mixed in 10 litres of water. Filled forage in the bag has to be pressed as hard as possible to remove oxygen and to create anaerobic condition. These steps are to be repeated with continued filling and pressing. Once the plastic bag will be full with chaffed green fodder, both the lips of the bag will be tied tightly to ensure anaerobic condition inside the bag. Silage bag should be stored away from direct sunlight and rain and kept it for 45 days. Weights such as stones, stone slabs can be placed on the bag to ensure compression on the filled forage. As plastic bag filled with silage is usually very heavy, it is advisable to fill it on the position where it will be stored. After 45 days, golden yellow colour and sweet smell with acidic pH of 3.7-4.5 indicates good quality silage. The prepared silage can be fed to the livestock as substitute for green fodder during period of need.

Conclusion

Maize is widely grown throughout the year in Bihar. Green fodder of maize can be conserved through silage making for its use during lean period or during the recurring flood events in Bihar. Making silage in polybag is cheaper and easier in comparison to making silage in pits for small holder farmers or landless labourers.

References

- Anonymous. 2017. Basic Animal Husbandry Statistics 2016. Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India, New Delhi.

- Anonymous. 2019. Agricultural Statistics at a Glance 2018. Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India.
- Kaur, I., Singh, V.P., Kaur, H., and Singh, P. 2012. Cost-benefit analysis of cow milk production in Punjab. *Journal of Agricultural Development and Policy* 22(1): 67-74.
- Parmar. P. and Misra, H. Focus needed on fodder shortage in India. The Hindu Business Line. 28 April, 2020. Available at <https://www.thehindubusinessline.com/opinion/focus-needed-on-fodder-shortage-in-india/article31453079.ece#> (last accessed on 06.08.2020)
- Patil, M., Desai, A. R. and Teggelli, R. G. 2019. Ensilaging in polyethylene bags: a low cost technology for resource poor livestock farmers. *International Journal of Livestock Research* 9(1):166-173.
- Reiber, C., Schultze-Kraft, R., Peters, M. and Hoffmann, V., 2009. Potential and constraints of little bag silage for smallholders-results and experiences from Honduras. *Experimental Agriculture* 45(2), p.209.
- Singh, H., Singh, V.P. and Kaur, I. 2018. Cost analysis of processing of green fodder crops in Punjab state. *International Journal of Current Microbiology and Applied Sciences* 7(11): 832-837.
- Singh, K. M., Singh, R. K. P., Jha, A. K., Kumar, A., Kumar, A. and Meena, M. S. 2013. Feed and Fodder Value Chains in Bihar: Some Empirical Evidences. Available at SSRN 2302259