7.2 BEST PRACTICES

7.2.1-Descibe two best practices successfully implemented by the institution as per NAAC format provided in the manual.

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Best Practices 1: Trash Management System

Sugarcane is a long duration crop which produces larger amount of biomass and absorbs considerable amount of nutrients from soil.About 40 % of its total biomass produces foliage. 100 tonnes of sugarcane absorbs about 140 kg of Nitrogen, 34 kg of phosphorus and 332 kg of potash from the soil. Usually farmers dispose the trash by burning itin the field, which pollutesthe environment by smoke and gases. Heat generated kills soil microorganisms and earthworms. All these undesirable effects could be avoided by in-situ trash management.RCSTIslampur has undertaken project on Trash Management at Borgaon,District: Sangli by demonstrating on one hector area. Following is the procedure

- After harvest, arrange trash in alternate rows.
- Shave the stubbles close to soil.
- Spray Hibiki -250 ml and Yamato-250 g in 100 lit of water.
- Irrigate the plot to soak trash into water so that sufficient moisture can be maintained.

For fast decomposition Cow dung slurry of 200 kg, 200 lit of water mixed with 10 kg of decomposing culture.

- Sprinkle the slurry on the sugarcane trash and 30 kg urea per acre to narrow down the C:N ratio which will result in to fast decomposition of trash.

Chopping of Sugarcane Trash with trash cutter:

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Results of the demonstrations of sugarcane trash management on farmer's field showed that application of trash @ 1 MT/ha reduced soil pH and EC and also increased the organic carbon content significantly. Similarly, yield of sugarcane is also increased by 4.10 %. The initial soil pH was 7.89; EC=0.3 and organic carbon %=0.65 but application of trash has beneficial impact on soil properties.

Nutrients were conserved @ N-50 kg/ha, P 20 kg/ha and K 1000 kg/ha; thus overall 5 MT of N; 2 MT of P and 10 MT of K on 100 ha of land under trash management whereas, if we convert it into equivalent fertilizer saving for 100 ha that would be 10.86 MT of Urea; 12.5 MT of SSP and 16.66 MT in terms of MOP.

If we convert it into economical terms, than about ` 3276/ha of monetary saving occurred due to application of sugarcane trash over no trash plot.

The in-situ trash management of sugarcane apart from reducing environmental pollution and soil hazards, helps to moderate the soil pH and soil EC and increases the organic carbon.

It also results in considerable cost advantage to farmers as fertilizer cost to the tune of about ` 3,276/ha is economized.

SUMMARY:

Sugarcane farmers are also happy by sugarcane trash management since they get an additional income of 18,000/ ha due to increase in yield of sugarcane @ 6 MT/ha. The effect of sugarcane trash management is such that the entire village has stopped burning of trash and around 25 % people of Borgaon and Palus block of Sangli district are now adopting the technology of sugarcane trash management.

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Abstract:

Sugarcane-trash management has now been widely applied in sugarcane cultivation systems. One of the sugarcane-trash managements is to return sugarcane bagasse to the land.In a tropical climate with humid and hot conditions, this practice would accelerate microbial activity to degrade the bagasse.

This, further, results in providing the availability of organic matter in soil nutrients. However, bagasse is also an appropriate growing medium for soil-borne fungi such as Sclerotium rolfsii, Rhizoctonia solani, and Xylaria warburgii.

These pathogenic fungi cause leaf midrib dry rot, ribbon midrib blight, and root rot diseases, respectively. Severe infection due to these pathogenic fungi would cause plant death and so decreased sugarcane production.

Sugarcane-trash management that accelerates the decomposition process of sugarcane trash and suppresses the development of soil-borne diseases needs to be developed. Integrating the techniques to accelerate the decomposition rate with sugarcane-trash management should be considered.

The techniques include inundation of primary decomposers, such as earthworms, addition of promoting substrates, and introduction of antagonistic microbes and decomposers, such as Trichoderma.

Sugarcane is a perennial crop planted from vegetative cuttings for 9-13 months. After harvesting, the shoots regrowing from the stump, known as ratoon cane. In some developing countries such as Indonesia, the ratoon cane could last for seven to 12 years (7-12 ratoon crops). Furthermore, sugarcane takes large amounts of nutrients from soil during its growth and development and requires to apply additional fertilizer to compensate the soil fertility to sustain sugar yields .Therefore, sugarcane grown under the monoculture system for ten years decreased soil fertility significantly.During sugarcane growth, every ton sugarcane/ha will uptake 0.56-1.2 kg N, 0.38-0.82 kg P2O5 and 1.0-2.5 kg K, 0.25-0.60 Ca, 0.20-0.35 kg Mg, 0.02-0.2 Na, and 2.0-2.7 out of the soil.Traditionally, in some sugarcane plantations mature sugarcane crops are burned before harvesting to help simplify the harvesting process which could reduce the labour cost or burning the sugarcane residues after harvesting before ratoon.The sugarcane trash (comprised of 54% of dry leaves and 46% of tops) was estimated at 10.7 t/ha (Franco et al., 2013) or even 8 to 30 t/ha (Carvalho et al., 2017). Burning of sugarcane trash is not environmentally safe, because it releases smoke and other toxic compounds that are harmful to human health and destroy the beneficial insects, such as parasitism and predators, and reduces insect diversity. Also, the trash burning caused soil microorganisms, small florals, and faunas are killed reported that population of sow bugs, spiders, ladybird beetles and ants numbers were reduced by 96%, 95%, 85%, and 61%, respectively, due to the effect of burning of sugarcane trash. Furthermore, silica contained in ash produced during the burning process polluted the surrounding areas and it could cause respiratory diseases.The organic matter and nutrients were also depleted, resulted in adverse soil conditions. Considering the negative effects of clearing and managing of sugarcane plantation land by burning, some sugar industries implemented a trash management system to improve the soil's physical conditions, as well as to increase the soil productivity. This

system allows sugarcane residues (dried leaves and litters) to be mulched or incorporated into the soil.

However, humid and hot conditions of some sugarcane growing regions, like those in tropical area, are conducive for soil-borne fungal pathogens, which are able to live saprophytically,to perpetuate and be pathogen inocula to cause diseases on subsequent planted crops. Therefore, in this paper we propose the management of sugarcane-trash to sustain the soil health and to decrease the risk of soil-borne diseases, particularly in tropical areas.

Practices on sugarcane trash management Research on trash management has been widely reported to have a good influence on sugarcane productivity, improve soil fertility, and would achieve sustainability.

Trash management implemented included retaining the trashes combined with the addition of compost. These practices improved soil physical, chemical and biological characteristics as well as increased the germination of sugarcane setts and yield, controlled soil erosion, increased microbial and small fauna activities, retained moisture and reduced evapotranspiration.

Reports on the positive effects of sugarcane trash management practices are presented in

Table 1.Germination of the setts was only 68% when planted in soil where the residues were burned, but the germination reached 82%, with average cane yield increased 12.8% when the trashes were ploughed and enriched with Trichoderma viridae.

Munoz-Arboreta and Quinter-Duran reported that the effect of retaining the trash on the soil increased yield on eighth ratoon cane (RC), but not in plant cane (PC).

The sugarcane yield in the PC was around 150 t/ha. The eighth RC yielded 80 t/ha when the trash was removed without addition of fertilizers. However, when the crops were fertilized, or the residues were mulched on soil, the cane yield increased by 30 t/ha.

The yield increased even higher up to 160 t/ha when application of fertilizers was combined with mulching. Mulching sugarcane trash in alternate rows reduces weed growth and conserves moisture as well. Sugarcane should be weed-free during tilling in the first two months. According to Hunsigi (1993), applying bagasse and or sugarcane trash at 3-5 t/ha between rows as mulch controlled weed.

Table 1. Reports of the benefits of sugarcane trash management practices published on 1990s to 2021 Management practices Results References Bagasse mulching 3-5 t/ha, applied between rows Control weed growth Incorporated sugarcane trash for 23 weeks Increased microbial biomass and activity, the numbers of free-living nematodes, and unknown predatory fungus, suppressed the plant-parasitic nematodes, so that reduced the sugarcane root infection by the parasitic nematodes.Mulching the soil by retaining the trash combined with application of fertilizer. Increase the 8th ratoon yield by 30 t/ha.Munoz-Arboleda and QuinteraDuran (2009) Mulching sugarcane trash in alternate rows Reduced weed growth and conserves moisture. Sivaraman (2014)) Retaining sugarcane trash Accumulated carbon in the soil surface to 30-cm depth Cerri et al. (2011) Plowing sugarcane residue and enriched with T. viridae Increased the germination of the sett by 82% and cane yield by 12.8%; increased organic carbon, nitrogen, phosphorus, and potassium in soil. Savitha and Suma.

Decomposition process of sugarcane trash Although incorporating or mulching sugarcane trash returns nutrients and organic matter to the soil, it will take a long period of time or years to obtain the effects. By this period, specific necrotrophic saprophytic pathogens which are associated with such media, could take the opportunity to survive in the biomass. Therefore, a safe, appropriate, and faster process of sugarcane trash decomposition should be taken into account in the choosing trash management method. Decomposition process of the sugarcane trash depends on the chemical composition of the trash, soil type, climate, water, and oxygen availability. Sugarcane trash mainly comprised of dry sheets and leaves with C:N ratio around 70-100:1 which caused the nitrogen immobilized and was not readily available for the next season crop (Robertson and Thorburn, 2007a; Ferreira et al., 2015). Mulching crushed sugarcane trash 10 t/ha on two types of only contributed 15% of nitrogen for the first six months, and then it declined slowly during 18 months (Kee Kwong et al., 1987). This meant that available N from the trash was fulfilled less than 10% of sugarcane need. Furthermore, Fortes et al. (2011) reported that the ratoon-cane plant was only used 20% nitrogen from the trash after incorporating residues to the field for three years.

Even Robertson and Thorburn (2007b) claimed that nitrogen from the trash persisted in the soil around 80% after six years of incorporation. Therefore, nitrogen fertilizer was still required in the first six years after incorporation, because it is needed to decomposing cellulose, hemicellulose and lignin consisted in the trash (Welker et al., 2015) as the soil microbes took a longer period to degrade the trash content matters (Jenkinson and Ayanaba, 1977). Degradation process of cellulose, hemicellulose, and lignin in sugarcane trash needs microbial consortia which produced enzymes for primary degradation and subsequent processes. Several species of cellulolytic, hemicellulolytic, and ligninolytic microorganisms including bacteria, fungi, as well as actinomycetes have been identified as decomposers associated with the sugarcane trash (de Vries and Visser, 2001; Dantur et al., 2015; Legodi et al., 2019). The study of cellulase which plays an important role in the degradation process of cellulose has been known to be produced by cellulolytic microbes. Bacteria from the genera Klebsiella, Stenotrophomonas, Microbacterium, Bacillus and Enterococcus isolated from the intestines of sugarcane-fed larvae of the moth Diatraea saccharalis were reported by Dantur et al. (2015) to have a good cellulolytic activity correlated with high extracellular protein concentrations. While Pinheiro et al. (2015) reported that cellulosic enzymes produced by several bacteria found in the gastrointestinal tract of snail Achatina fulica, including those from the genus Cellulosimicrobium, Microbacterium, and Agromyces had the ability to degrade cellulose contained in sugarcane bagasse. Degradation of hemicelluloses, such as glucan, xylan, arabinan, galactan, and mannan, requires several enzymes from microbes (fungi, bacteria, and actinomycetes) and also small faunas.There were also three bacteria (B. macerans, Cellulomonas cartae, and C. uda) found by Singh et al. (2008), which were able to degrade cellulose and lignin into fermentable sugar. One of the critical issues related to the implementation of enzymes to improve the biomass use in Brazil is to search for novel and potent strains producing lignocellulosic enzymes (Valencia and Chambergo, 2013). Lignin has a complex structure, high molecular weight, and water insolubility make it is challenging to degrade (Pérez et al., 2002). Lignin also prevents the penetration of hemicellulose and cellulose degraded enzymes since it binds them to form a physical seal between them (Howard et al., 2003). Ligninolytic enzyme produced by Phanerochaete chrysosporium, a white rot fungus, removed 62.59% - 65.63% lignin on sugarcane bagasse (Ramesh et al., 2021). Ligninolytic enzyme decomposed lignin of sugarcane bagasse and enhanced both

labile and stable components of soil organic (Phukongchai et al., 2022). Decomposition of retained sugarcane trash in the field has a good impact on the soil, nonetheless it would cause soil-borne pathogens associated with it to become a serious disease problem, especially in tropical areas which bear high humidity. Accelerated decomposition process is expected to overcome this problem. We propose some techniques for accelerating the sugarcane degradation rate. Acceleration of sugarcane trash decomposition requires the induction of several microbial activities. mainly those that responsible for cellulose, hemicellulose, and lignin degradation. There are several alternative methods to boost the process, i.e., introducing of primary decomposers. addition of promoting substrates, and introduction of decomposer microbes.

India ranks the first or second in production of sugar in the world. This is one of the main cash crops grown in India. It takes about 12-18 months for maturity. Sugarcane is an irrigated crop. It has adverse effect on quality of soil. Sugarcane trash is a valuable organic source of plant nutrients.

Trash contains N-0.43% P- 0.04% K-0.35% Ca-0.15% Mg- 0.03%
C- 20%

If sugarcane trash is brunt then about 75% of the nutrient in trash are burnt and no more available as a plant nutrient. Because of limiting land. Mono-cropping of sugarcane is followed in many sugarcane growing area secondly sufficient amount of organic manures are not applied. This has resulted in degradation of soils. These soils are degrading day by day because of low carbon content and there by compaction of soil less aeration, less microbial activity lower content of plant nutrient resulting low productivity.

Sugarcane trash management / mulching saves moisture avoiding moisture stress, suppresses weed, protects soils from extreme temperature ultimately it in increase organic carbon and provides valuable plant nutrients also.

Sugarcane trash management is therefore very beneficial to help to overcome the problem of soil deterioration and thereby help to increase soil productivity.

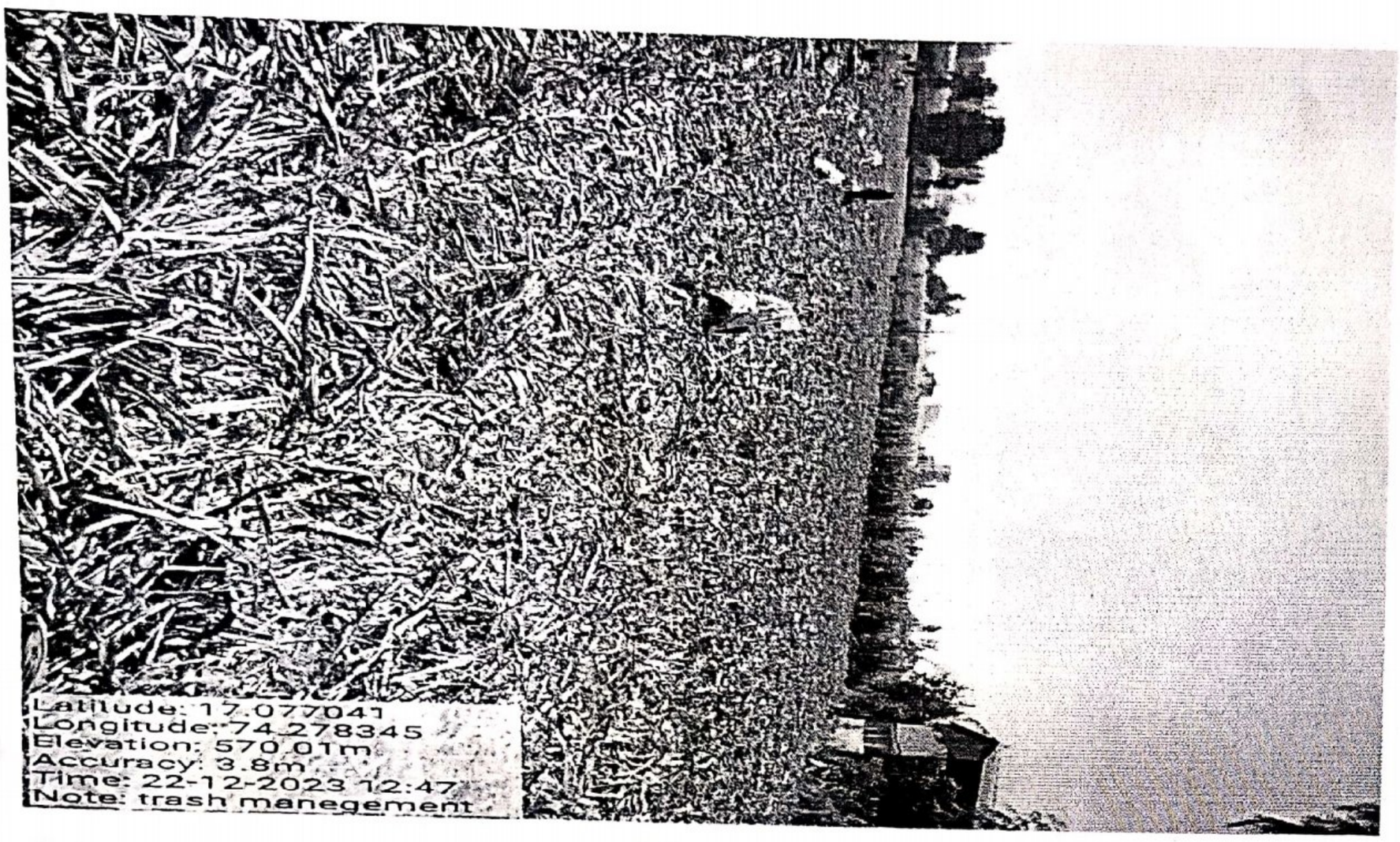
Methodology

The following methodology is used in areas where wide spacing sugarcane planting is followed (in western M.S.0 i.e. 4/ 5 planting)

1. After harvest trash on the top of the ridges is collected and put/ placed in the ridges. This allows good sprouting of buds. Trash is left as it is when there is shortage of water. Chemical fertilizers are given by crowbar technique and by foliar spray water is given as per availability.
2. When sugarcane is harvested using sugar harvesting machine or when trash cutting machine is used, then pieces of trash are manged to leave in furrows not to have problem of sprouting of eye buds on sugarcane stubbles
3. Then. light irrigation is given. light irrigation allows swelling of soil providing good aeration.
4. In our area many forms go for decomposing the trash, therefor urea and single super phosphate is broadcasted @8kg and 10 kg per M.T. of trash respectively on the pieces on trash in ridges. Then trash decomposing culture and along with 500 to 2000kg

compost/acre is also broadcasted and again crop is irrigated. The trash is decomposed during 6-8 weeds.

5. Farmers then also use off baring implement or implement used for light earthing up is used to fall soil on trash pieces. This helps in early decomposition of trash by maintaining moisture. In this way trash is decomposed and is useful for enriching soils.



Conclusion:

Sugarcane-trash management by retaining the trash on the field is essential to be done. The retained trash will decompose naturally and then provide a vital major and minor plant nutrients, as well as essential soil organic carbon. Decomposition of sugarcane trash will improve overall soil productivity.Sugarcane-trash management involves micro fauna and microbial decomposers which play an important role on decomposition process. The decomposers include soil-borne disease which on initial decomposition process act as saprophytes. However, when the climatic conditions are optimal, particularly in tropical regions with high humidity and temperature, pathogenic microbial soil-borne diseases can thrive. Therefore, acceleration decomposition techniques must be integrated into the sugarcane-trash-management system. Beneficial microorganisms primarily serve as antagonists to pathogenic microorganisms in the acceleration of degradation.

Trash Management

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Best Practice 2: STAFF ACADEMY

Introduction:

Staff academy of our college was established with the view to inspire and motivate teachers for participation in group discussion, paper presentation and development of research attitude. On every Saturday one staff member or expert for outside will guide the staff. The main aim of staff academy is to exchange the thoughts and knowledge of the teachers. For this purpose, weorganize guest lectures, discussions and training programs for the staff. Also we promote our staff to present their views about the specializations.

Aims and Objectives:

1. To enhance the knowledge of the staff.
2. To introduce new trends in teaching and learning.
3. To promote research culture through introduction of various research techniques.
4 .To provide the platforms for discussion on current trends.
5. To update the staff with the technology and ICT techniques.

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Staff academy of our college was established with a view to inspire and motivate teachers for participation in group discussion, paper presentation and development of research attitude.

The Staff academy committee is formed at the beginning of every academic year. Every Saturday individual staff members gave presentation on their scheduled date.

In the academic year 2023-24 staff academy organised the number of lectures on various subjects in order to enhance the knowledge of teachers of our college other than there own subjects.

The main objective of the arrangement of the lectures was to exchange the thoughts and knowledge of the teachers.

The inauguration ceremony of staff academy was held on 19/08/2023 under the guidance of Principal Hon.Dr.A.N.Basugade and all the teaching staff of the college were present for this inauguration ceremony. During 19 August 2023 to 21 August 2023 our college teachers were delivered the lectures on various subjects under the staff academy.

Sr.No	Name of staff	Department	Day and date of presentation
1	Dr.A.N.Basugade	Department of Staff	18 August 2023 10.30 am
2	Mr.A.V.Magdum	Department of Engineering	18 August 2023 at 12.30 pm
3	Mr.R.M.Pawar	Department of Sugartechnology	19 August 2023 at 10.30 pm
4	Mr.M.L.Kadam	Departemnt of Alcoholtechnology	19 August 2023 at 12.30 pm

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Staff Attendance

Date: 18/08/23

Sr.no	Name of Staff	Signature
1	Dr. A. N. Basugade	Basugade
2	Mr. R. M. Pawar	
3.	Jadhav D. V	Jadhav.
4	Jagdap M. N.	
5	S. B. Charan	
6	Pawar. K. J.	Pawar
7.	Mamar. A. S.	AVANCY
8.	Pawar S.J.	
9.	Patil. A. S	Apatil

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