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Sustainable Strategies to Improve the Quality and Quantity of Sugar Cane Pre and Post –Harvest by Optimizing Management in Pakistan

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Abstract
The purpose of this research was to carried-out the various techniques from sowing to harvesting of sugarcane in order to maintain and enhance the recovery of sugarcane. Sugarcane needs more time to apply a large amount of biomass accumulates, various amendments of cultural practices and high management from cultivation to cutting time. Number of treatments before harvest had more recovery in T1 green manuring and stubble rotation was 9.86 and in T2 CPF 251 variety having more deterioration capacity after ripening maximum recovery was 11.40. While in T3 IPM virtako and trichogramma cards having more recovery 90.90 apply and installed different interval of time. Therefore, in T4 bio fertilizer and gypsum having highest recovery 10.08. After post harvest maximum recovery loss in T5 sour cane 7.93, while after 96 hours from cut to crush loss in 8.8 and reported 24 hours from cut to crush recovery were noted 10.90. Implied waste is enhanced throughout in the field, storage, carriage, treatment mainly in the mills which do not keep suitable sanitation control. Improving sugarcane and making of sugar disseminate by several conditions. Profuse research obtainable on justification of post-harvest deterioration and manageable standards accommodate it. It is concluded that fine variety us 633 has lees deterioration adaptation of new technologies, early maturing, sowing techniques, fertilizer management (stubble rotation, green manuring, bio fertilizer), trash mixing into soil increase the soil health as well as increase the yield and also eco friendly as well as atmospheric save and other infrastructure amenity such as mill management, its capacity and machinery.

Keyboard: Fertilizer management, disease management, insect pest management, crop climate

Introduction

Sugarcane is the 2nd biggest crop of Pakistan and covers 0.966 million hectares providing about 3.6 percent of gross domestic production (GDP). Recently sugarcane crop cultivated area about 4.8 percent and 11 percent share to the total crops (Srikanth et al.,2022).

IPM is an economical method to decrease the insect pest generation under economic threshold level (ETL) (Abinaya et al.,2023). Currently IPM is to incorporate the fraudulently growing system, the application of chemical, biological and choice of resistant varieties (KUMAR et al., 2023).

Perpetual utilization of pesticides also had a harmful impact on the microorganism breaking down, soil minerals degradation and crop function. However, use of large amounts of pesticides remaining constant in the soil can affect the soil system that is harmful to land, atmosphere and human health (cycon et al.,2017). For transpiration that nutrients and water absorbs by the roots, suitable water quality is necessary, in drought situation is affected which is ultimately decrease the cane recovery (Lakshmanan et al 2014., Lobell et al 2011).

Decomposition in crop debris and fertilizer surveillance produces great effect on the production and recovery of sugar cane crop. Crop decomposition into soil, their structural and regular division in stem, roots and strong fertilizer ambulation impact on the soil microorganisms and soil bacteriological activity (Govaerts et al., 2009).

Sucrose and CCS were enhanced by the utilization of large amounts of organic manures (Mathukia et al 1999). Phenolic acid and aliphatic acid excrete during the breakdown of organic manures which increase the efficiency of phosphorus. Talashiltar and Patil (1979) utilization of organic matters decreases the wastage of phosphorus and is easily available to the crop. Rotate the crop residues and green manuring improve the soil structure as well as increase the efficiency of nutrients and increase the quality of sugar cane

Ghosh et al. (1981).

The sugar recovery is mainly pivot on standard cane and stake cutting organized at ranch side and deftness of mill on mill factory and probably can enhance range 0.4-0.6% with energetic working of mill and range 1.5-2 % with more recovery and propitious post cutting amendment.

Varietal loses

The amount of moisture decrease that is maintained by various methods to save evaporation by specific genotype cane and impact on post harvest deterioration (lauritezen 1942), (lauritezen and Balch 1948). Hard rind and thin cane genotype are extrapolated to be better dissident after post harvest degeneracy (kapur and kanwar 1987).

Varietal Sugarcane crop is bio-decline behind cutting is varietal genotype (cross and Belli 1915),Haldeen 1933), (Hall 1914).sugar cane show different impact on post harvest sucrose decrees. (Hall 1914) was the first to explain the importance of sugarcane varieties in post – harvest losses and (Egan 1931) observed the varietal effect on such losses. Various genotypes show variables to post harvest damage because of genetic strait (kapur and kanwar 1976), (kapur and kanwar 1981). Sugar cane Varieties are main part that effect on the sugar cane quality which is impact by the atmospheric situation and management advances (lauritizen and bulch 1948).

Sugar recovery

Shortly ensuing cutting, there is propensity decrease in sugar recovery .vapid after 24 hours consequently profuse decrease in yield because of diffuse liquid in juice in sucrose amount caused by inversion (Grosss and bell 1917) and it is one of the great important issue for sugar mills (Solomon 2000).it is observed that stale cane for 96 hours cause loss in quantity from 7.4-17% (Darti and joshi 2015) and sugar quality (2%) (parkhyana 2009). Loss in quality from field it make problem by decrease mill and boiling house capabilities (Garewal 2017). It escorts to enhance waste of sugar in molasses (Sharma and kumar 2015).

The recovery breakdown in mature cane cutting is basic biochemical activity. The decline is due to microorganism. These microbes infiltrate from wound end of sugar cane and change sucrose into polysaccharides that is dextrin. Existence of dextran in a little quantity produce hassle in filtration, clarification, crystallization and change the structure of sugar crystal which impact on the recovery of sugar (Solomon 2000), (Bukhari 2020). The sucrose amount is less among sugarcane producers of the world. It is clearly that quality of sugar cane is about 10% from ten years due to modernization works in the mills (KPMG 2017) , (Gol 2013) .

Best management to control deterioration from cut to crush must be minimum (tilbury 1969;Vickers 1968).

Factor in Post-harvest cane deterioration

In two places post cutting decreases the recovery dropping cardinal to less quality. The main dissipation embraced sucrose inversion system, succeeding cutting of cane and ensuing drain in carriage to the mills. The stale and sour cane are two various phases of cane decline behind cutting. The stale cane is full mature cutting of sugar cane which have decreased sucrose till carry on inversion and respiration, while sour cane is microbial spoliation of sugar cane by lactic acid bacterium leuconostoc type that is change sucrose into organic acid in distinctive sour aroma (Alaxander 1973), Therefore these two types appear to work at same time in cane to destroy recovery and milled juice. Another deprivation incorporates the mills waste required to inversion dextrin, alcohol and acid formed from taken juice occurrence to inadequate and swirly manufacturing. The chief components that command post harvest retrogression in sugar cane involves cane variety, weather, sugar cane maturing, biotic and abiotic distress include various supervision matters such as cutting method, carriage and storage system in the factory. Variety plays an important role in sugar quality and relies on atmosphere and management practices. Anyhow genetic variability various genotypes show diversely to post harvest deterioration. The genetic nature (highest quality) morphological features like stem girth, rind hardness, wax coating to adjudicate proportion of post harvest deterioration (uppal and Sharma 1999),(sidnat etal 2008), (sexana etal 2010).

It is observed that climate plays an important role to indicate the range of deterioration. Harmful impact of hot temp about 40C and less humidity 25-35% on juice quality noted by various researchers (uppal and Sharma 1999), (Cardao and sentalhas 2013). Loss in ccs noted that most late crushing in hot season 1.32 units per day and during mid season crushing in feb 1.0 unit per day and in cool season 0.35 unit per day (Singha etal 2015). Dirty situations in post harvest decline in recovery division of polysaccharides create bacteria-like traits of leuconostoc (wold 1946). More temperature is noted to produce dextran stored in cane. Therefore results shows that weather is the most important role in decreasing the quality of sugar behind cutting, anyhow variety effects on the deterioration system yet to much extend (Cardao and sentalhas 2013). The range of post harvest based on the cane ripening. Low ripening or full mature cane decline quickly as opposed to ripening cane. Cane ripening is a chief component to control the range of inversion in cutting cane. This deterioration is commensurate quickly in summer (Solomon 2000), (parkhyana 2009). Immature cane is low incline to post harvest decline as contrast to the cut down or fired cane (Solomon 2000 15), (Turner and Rojas 1963). Late cutting of fire cane after 24 hours decrease in sugar production (Eggleston 2001). Machine cutting of fire cane or unfired cane decreases the cane quality as well as sugar recovery in the world. In machine cutting cane with more trash peace, drop in purity, sucrose and phosphate gratification is noted (Egan 1963). In this observation sugar cane lodging late milling period determined the 1.0 unit decrease in CCS every day while in the old method cutting completely immature cane was proportionally low (Solomon et al 2007).

Climatic factor

In biotic and abiotic distress exaggerated the cane action of deterioration sets in advance cutting which decrease the recovery if cut to crush is late (Galon etal 2013). Cane transport from farm to mill and storage systems in the mill do govern the quality of harvested cane. Transport of fresh cane in small storage containers is less prone to deterioration. The cleanliness and hygiene in the yard is therefore, an important factor and first cane in should be the first cane out (Solomon 2000).

Economic loss

Canes carried to the mills are deteriorated. Around ¼ of stale cane were carried to mills which decreased Rs 1600 crores to sugar mills . According to the (Perry et al 2007) , this problem increase the cast of sugar factory about 6 million dollar per years .it is observed that sugar factory condition observed crush the stale cane (stored about 72 h) consequently loss three –five million with crushing capacity of 5000 TCD (Solomon, 2009).Describe by (Rao 1989) there is decrease in quality about 2% when sugar stored about seven hours and decrease 7.7 kg/tcg in sugar quality about 1 hour late crushing (chen et al 1993). Therefore (solomon 2009), observe that decrease In one unit in pole % from cutting to processing . Normally stale canes decrease recovery about 12-50%. One ton of cane is processed, about 5 -10 kg of sugar cane is decreased. It may increase when the crushing season is long with more temperature. Physical losses occurred when more or less temperature ,less relative humidity ,air and rain are some assumptions. Secondary losses occurred in damp when hot situation appeared in the presence of bacteria that excrete sucrose inverting enzyme (Lionett 1986). Due More temperature sucrose inversion is more than at less temperature (Shukla 1994).

Materials and Methods

Management of sugar cane from cultivation to harvesting of sugar cane. For improving the recovery of sugar cane before and harvest of sugarcane. Rotate the residues of sugar cane crop and green manuring of standing crops before flowering. At the time of sowing use of bio fertilizer two bags, ten bags of gypsum and one pack 8kg virtako into the mounds of ridges. In this experiment complete randomized block designs were used. After 90 days six time trichogramma cards were installed with the duration of 20 days, repeated after 20 days six times in the same field. Three highest brix varieties were cultivated CPF 237,CPF 251,YTFG 236 to increase recovery of sugar cane.

The samples were collected randomly from the sugar cane crop, and completed three sugarcane raton. The samples were taken from 2020-2024 cut at various time in the last month of November 2000 (plantation),the first ratoon 2021 and the second raton in February 2021. The temperature was about 20c at the time of sampling and development duration was 10 months. Green long canes sample were collected and then stale cane samples were collected after five days, 70 hours, and 96 hours on the same day. Every sample consists of 20 green complete bunch (green long ,23 m) taken randomly through sugar cane crop and after 24 hours 20 complete bunch (long cane 23 m), similarly cane were taken after 48, 72 ,96 hours from the same sugarcane crop. Cane was cut manually to protect deterioration from mechanical harvesting, and the bunch were cut from the base of sugar cane and separate the green leaf (green chopped) and after 5 , 48, 72, 96 hours bunch were chopped into around 45 cm long billets and stored in a polyethylene bags. The sample were stored in laboratory, and stored for 24 hours 48 hours, 72 ,96 hours , at room temperature 25 °C) for analysis.

Results and Discussion

Therefore, raising dextran immersion in sugar cane liquid may contemplate the cut and deteriorate by lactic acid bacteria throughout sowing to harvesting; also many components

like atmosphere and climate conditions either chop or delay all of them differently in spring sowing as well as raton. After harvesting less than five days late to increase the dextran amount in sugar cane juice it is predicted from observation duration after cutting should not delay 4 days.

Sugarcane crop is bio-decline behind cutting is varietal genotype (Gol 2013),(Eggleston 2007),(Hall 1914), Sugar cane shows a different impact on post harvest sucrose decrease. (Eggleston 2007) was the first to explain the importance of sugarcane varieties in post – harvest losses (Eggleston 2001) observed the varietal effect on such losses. Various genotypes show variables to post harvest damage because of genetic strait (Kanwar ana Kapur 1976),(Kapur and Kanwar 1981). Sugar cane Varieties are the main part that affect the sugar cane quality which is impacted by the atmospheric situation and management advances (Lauritzen 1948).

In treatment CPF 251 have more recovery 11.40; this variety has good character less deterioration and high recovery as shown in table 2. Hard rind and thin cane genotypes are extrapolated to be better dissident to post harvest degeneracy (kapur and Kanwar 1987). This is more susceptible to maintaining recovery and saving the sucrose contents. Sugarcane crop is bio-decline behind cutting is varietal genotype (Gol 2013),(Eggleston 2007),(Hall 1914), Sugar cane shows a different impact on post harvest sucrose decrease. (Eggleston 2007) was the first to explain the importance of sugarcane varieties in post –harvest losses (Eggleston 2001) observed the varietal effect on such losses. Various genotypes show variables to post harvest damage because of genetic strait (Kanwar ana Kapur 1976),(Kapur and Kanwar 1981). Sugar cane Varieties are the main part that affect the sugar cane quality which is impacted by the atmospheric situation and management advances (Lauritzen 1948).

While in treatment, YTFG 236 have 11.36 have deteriorated and not maintained recovery because the variety has not a good character to deteriorate sugar(cane.Lauritizen 1942 , Lauritizen 1948), reported that the amount of moisture decreases which is maintained by various methods to save evaporation by specific genotype cane and impact on post harvest deterioration. Hard rind and thin cane genotype are extrapolate to be better dissident to post harvest degeneracy. (Cross and Bellile 1915), Haldane 1933, Hall 1914), observes that sugar cane crop is bio-decline behind cutting is varietal genotype. (kapur and Kanwar 1976 , (kapur and Kanwar 1981), explain that Various genotype show variable to post harvest damage because of genetic strait as shown in fig 2.

Therefore in CPF 237 have less recovery 10.68 and have less capacity to deteriorate post harvest. This variety is high brix and early maturing and after maturing it suddenly falls down from 10 to 7 degrees in the month of mid February. (Eggleston 2007) was the first to explain the importance of sugarcane varieties in post –harvest losses. (Egan 1971),observed the varietal effect on such losses . (laurritizen and Balch 1948), sugar cane Varieties are the main part that affect the sugar cane quality which is impacted by the atmospheric situation and management advances as shown in fig 2.

In treatment trichograma recovery was seen 9.75, trichogramma cards were installed 6 times in the field In pest management biological control trichogramma card (Vengopal S. et al., 1968), more repetition of trichogramma cards increase the growth as well as increase the recovery of sugar cane (Vengopal S. et al., 1968). By this bio agents eat the egg and lay their eggs into the host eggs for further generation as shown in Table 3.

While in the virtako recovery was noted 9.50 which is less than trichogramma used. (Cycon et al.,2017), reported that perpetual utilization of pesticides also had harmful impact on the microorganism breaking down, soil minerals degradation and crop function. However use of large amounts of pesticides that remain constant in the soil can affect the soil system that is harmful to land, atmosphere and human health. Lakshmanan et al 2014., Lobell et al 2011), say that for transpiration that nutrients and water absorbs by the roots ,suitable water quality is necessary, in drought situation is affected which is ultimately decrease the cane recovery .

In the treatment both trichograma and virtako recovery was 9.90, biological agents get protein from borers eggs and lay their eggs inside them for further generation, damaging the borers attack. Virtako effect on the borers larvae and stop further borers attack which is a very effective method to control bores generation as shown in table 3. In addition, (Abinaya et al., 2023), stated that IPM is the best method to control pest management . IPM is an economical method to decrease the insect pest generation under economic threshold level (ETL). (KUMAR et al., 2023), describe that Currently IPM is to incorporate the fraudulently growing system, the application of chemical, biological and choice of resistant varieties (KUMAR et al.,2023). It is a very effective and easy method and sustainable to decrease the borers attracted to the sugar cane belt as shown in fig 3.

In crop residues to rotate the stubble in the soil recovery was noted 8.81. Crop waste was mixed in soil to increase the soil fertility. (Govaerts et al., 2009), say that decomposition in crop debris and fertilizer surveillance produce great effect on the production and recovery of sugarcane crop. Crop decomposition into soil, their structural and regular division in stem, roots and strong fertilizer ambulation impact on the soil microorganisms and soil bacteriological activity as shown in table 1.

While in the treatment green manuring recovery was seen 9.65, the standing crops rotate to enhance fertility of soil. (Mathukia et al 1999) , Stated that sucrose and CCS were enhanced by the utilization of large amounts of organic manures.

In treatment both stubble and green manuring recovery was noted 9.86 maximum recovery was noted. (Talashiltar and Patil 1979), explain that phenolic acid and aliphatic acid excrete during the breakdown of organic manures which increase the efficiency of phosphorus. Similarly (Ghosh et al. 1981), utilization of organic matter decreases the wastage of phosphorus and is easily available to the crop. Rotating the crop residues and green manuring improve the soil structure as well as increase the efficiency of nutrients and increase the quality of sugar cane as shown in fig 1.

Sugarcane crop is bio-decline behind cutting is varietal genotype (Gol 2013),(Eggleston 2007),(Hall 1914), Sugar cane shows a different impact on post harvest sucrose decrease. (Eggleston 2007) was the first to explain the importance of sugarcane varieties in post – harvest losses (Eggleston 2001) observed the varietal effect on such losses. Various genotypes show variables to post harvest damage because of genetic strait (Kanwar ana Kapur 1976),(Kapur and Kanwar 1981). Sugar cane Varieties are the main part that affect the sugar cane quality which is impacted by the atmospheric situation and management advances (Lauritzen 1948).

Maximum repeat gave more growth due to free from the borers eggs in the crop; no sign of attack were seen, fresh crops get more growth as well as increase the yield and recovery. Note the b biological control agent was seen to get protein and gave their eggs insides internode bores in the sugarcane crop seen about 7-55% (Vengopal S. et al., 1968).

In trichogramma cards replication 6 times gets 9.75 recovery. (Vengopal S. et al., 1968) research that more repetition of trichogramma cards increase the growth as well as increase the recovery of sugar cane. Borers emerge after 27 -35 days trichogramma cards were repeated after 20 days intervals from .

In treatment of virtako recovery was 9.50, contaminating the water as well as damaging soil microbes. Cycon et al., (2017), say that perpetual utilization of pesticides also had harmful impact on the microorganism breaking down, soil minerals degradation and crop function. However, use of large amounts of pesticides that remain constant in the soil can affect the soil system that is harmful to land, atmosphere and human health. For transpiration nutrients and water absorbed by the roots ,suitable water quality is necessary, in drought situations which ultimately decrease the cane recovery (Lakshmanan et al., 2021 and Lo bell et al., 2022).

In the treatment both virtako and trichogramma cards were used to get maximum recovery 9.90 (Abinaya et al., 2023). IPM is an economical method to decrease the insect pest generation under economic threshold level (ETL). Kumar et al., (2023) reported that IPM is

to incorporate the fraudulently growing system, the application of chemical, biological and choice of resistant varieties.

In the stubble rotation get recovery Decomposition in crop debris and fertilizer surveillance produce great effect on the production and recovery of sugar cane crop .crop decomposition into soil ,their structural and regular division in stem, roots and strong fertilizer ambulation impact on the soil microorganisms and soil bacteriological activity (Govaerts et al., 2009) In treatment nutrient management bio fertilizer recovery was noted 10.05. (Tate 1987), describe that bio fertilizer increases the soil texture by improving overall standard. That will increase the moisture retention in the soil as well as exchange of gases . Therefore bio fertilizer have great importance to decrease the soil borne disease.

While in the treatment of gypsum recovery was noted 9.86 (Mohandus et al 1983), apply gypsum mix into the soil that enhance the texture of loamy soil therefore water have enable to enter into the soil is increased the sugar cane growth due to addition of ca into the soil.

In treatment both bio fertilizer and gypsum recovery was noted 10.08. (Caires et al., 2006), (Nora and Amado, 2013), agricultural or mineral gypsum (CaSO4 .2H2O) is being widely used as source of nutrients such as calcium and sulfur and to adjust aluminum toxicity in the deeper soil layers. Duluca (1987) described the increase in the structure and absorption ability of fertilizer. (Hointtink and Fahay (1986) noted that bio fertilizer has great importance to decrease soil borne disease.

Compost enhances the production as well as increases soil fertility and sugar cane cultivated for many years (Hallmark et al 1995). Production enhanced by the application of compost (Bevacqua and Mellano,1994 ,Roe et al1997),bio fertilizer have no drawbacks on the crop production. Similarly gypsum and bio fertilizer have a great role in the fertility of soil and sugarcane disease, ultimately enhancing the yield of sugar cane (Breithaupt et al 1991). Gypsum is more important to decrease soil borne disease in many crops (Kao and ko ,1986) However 11.2 and 22.4 M g ha gypsum is use for loamy soil to enhanced the yield of two year old sugarcane crop (Breithaupt et al 1991) Sulfur is very important after nitrogen phosphorus potassium to increase yield and quality of sugarcane (Jeschk and diedrick 2010). Sulfur remained deficient in the past for getting more yield and needed more sulfur , absence of sulfur decreased the environment as well as being deficient of organic matter (AW, PW and JH, 2005; Ceccotti, 1996).

In treatment after 48 hours recovery was 10.90 noted which decrease the recovery by delaying of crushing. (Gross and Bell 1917) noted that shortly ensuing cutting, there is propensity decrease in sugar recovery .vapid after 24 hours consequently profuse decrease in yield because of diffuse of liquid in juice in sucrose amount caused by inversion , and (chen etal 1993) ,it is one of the great important issue for sugar mills . (Solomon 1994) describe that canes carry to the mills are deteriorated around ¼ of stale cane were carried to mills which decrease Rs 1600 corers to sugar mills . according to the perry et al 2007) ,this problem increase the cast of sugar factory about 6 million dollar per years .it is observed that sugar factory condition observed crush the stale cane (stored about 72 h) consequently loss three –five million with crushing capacity of 5000 TCD (Solomon, 2009). Describe by Rao 1989) there is decrease in quality about 2% when sugar stored about seven hours and decrease 7.7 kg/tcg in sugar quality about 1 hour late crushing Solomon 2015). Therefore (Solomon 2009), observe that decrease in one unit in pole% from cutting to processing. Normally stale canes decrease recovery about 12-50%. One ton of cane is processed about 5 - 10 kg sugar cane is decrease has been fallowed. It may be increased when crushing season is long in more temperature. Physical losses occurred when more and less temperature, less relative humidity, air and rain are some assumption. Secondary losses occurred in damp when hot situation appeared in the presence of bacteria that excrete sucrose inverting enzyme Lionett 1986. Due More temperature sucrose inversion is more than at less temperature

Shukla 1994.That is due to more decrease in subtropical region about 9.03-24.47% 4141 than trpical areas around 7.10-16.59% 5.

In treatment after 72 hours recovery was seen 9.71 decrease recovery after few hours .(Datri and Joshi 2015), it is observed that staling cane for 96 hours cause loss in quantity from 7.4-17%) (Rakkiyappan 2009) sugar quality (2%) . Loss in quality from field it make problem by decrease mill and boiling house capabilities. (Grewal 2017),It escort to enhance waste of sugar in molasses (Sharma and Kumar 2015),Explain he recovery breakdown in mature cane cutting is basic biochemical activity. The decline is due to microorganism. (Solomon 2000 , Bukhari 2020) Say that microbes infiltrate from wound end and change sucrose into polysaccharides that is dextrin. Existence of dextran in a little quantity produce hassle in filtration ,clarification , crystallization and change the structure of sugar crystal which impact on the recovery of sugar as shown in table 6.

In the treatment after 96 hours recovery was observe 8.81 ,after 4 days dextran level increase the and decrease recovery of sugarcane . (cuddihy et al 2000; Solomon 2000), noted that the amount of dextran exceeded on the 5 days, a condition in which bacteria made at normal situation for dextran making. Dextran amount in sugar cane juice enhance on 5 days behind the harvest. Research shows that taken from raton and plantations. Early stage enhanced dextran makes up on the five days that sugar cane is normally hygienic by lactic acid bacteria which is present at the sowing time. Late cutting to crushing is normally dangerous for sugarcane juice decline and deterioration by dextran-making lactic acid bacteria, especially leuconostoc. They are made through late ,and enhance the amount of dextran. (Solomon 2009 and Ahmad et al. 2007), observation shows that chopping may enhance risk dextran making in sugar cane .

In the treatment factory loss noted recovery 8.41 . (Soloman 2009), say that the range of wastage of sugar mill is noted about 5-10 kg sugar per ton of cane logging may be exceeded when crushing season is increased in hot months as shown in Figure 6.

In treatment stale cane recovery was seen 8.38 . The stale and sour cane are two various phases of cane decline behind cutting. (Alaxander 1973), observe that stale cane is full mature cutting of sugarcane which have decreased sucrose till carry on inversion and respiration, while sour cane is microbial spoliation of sugar cane by lactic acid bacterium leuconostoc type that is change sucrose into organic acid in distinctive sour aroma as shown in fig 5.

In treatment sour cane recovery loss 7.93.(Ravelo et al 1991),explain that approximately 13% wastage because of chemical inversion, 25% due to activity of enzyme and estimated that 62% is fed by the micro organism occurred in juice and factory. Hence suitable mill cleanness utilization of good biocides is very essential to increase the processing capacity and sucrose quality as shown fig 5

Table 1. Crop residues to Increase Recovery of sugarcane

Crop Residues	Stubbles rotation	Green manuring	Green manuring +stubble rotation
T1	8.31	8.65	8.51
T2	8.80	8.15	9.30
T3	8.81	9.65	9.86

FIG 1: Crop residues to increase recovery of sugarcane

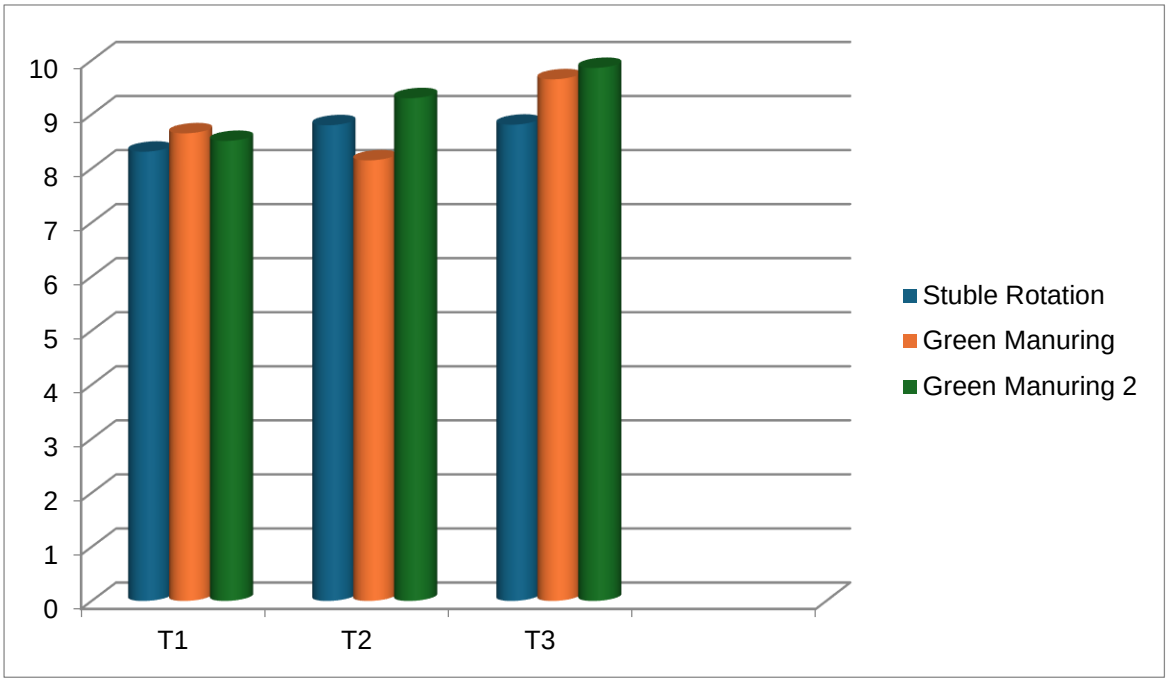


Table 2: Varieties deterioration resistant genotype of sugarcane

Cane duration	CPF 251	YTFG 236	CPF 237
T1	10.94	10.50	10.60
T2	11.17	10.95	10.64
T3	11.40	11.36	10.68

Figure 2 : Varieties deterioration resistant genotype of sugarcane

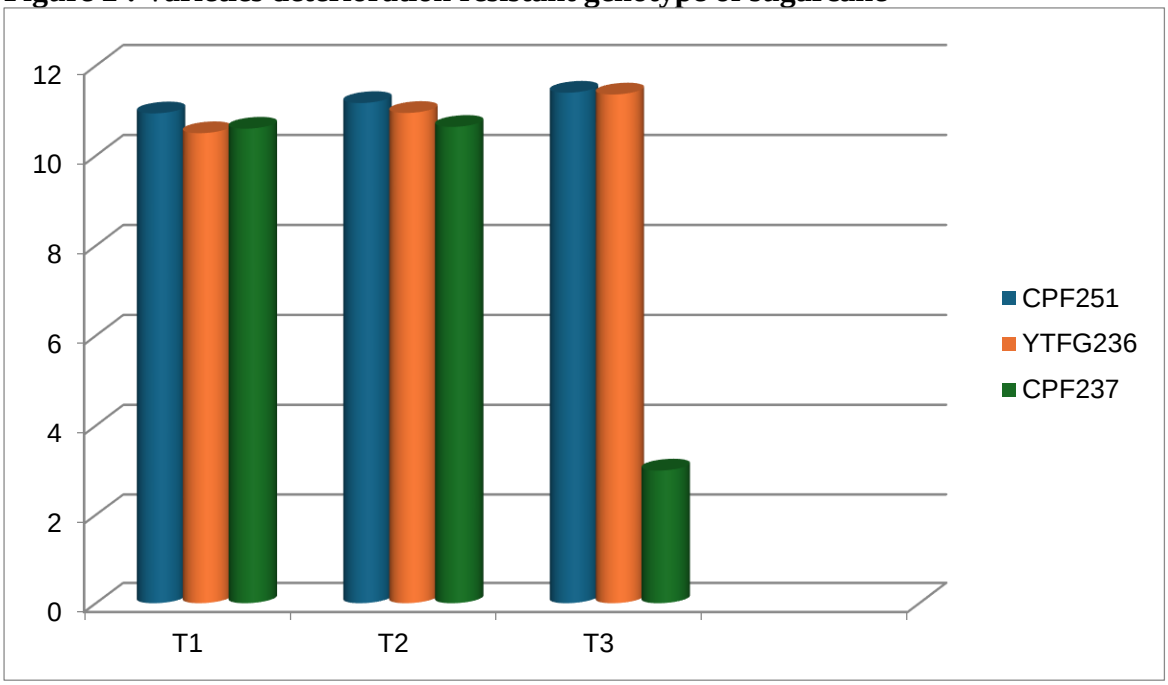


Table 3: Insect pest management sum of trichograma, virtako, TO Increase Recovery of sugarcane

Pest Management	Trichogramma	Virtako	Virtako+trichogramma
T1	9.60	8.8	9.45
T2	9.30	9.40	9.70
T3	9.75	9.50	9.90

Figure3: Insect Pest management of trichograma ,virtako, to Increase Recovery of sugarcane

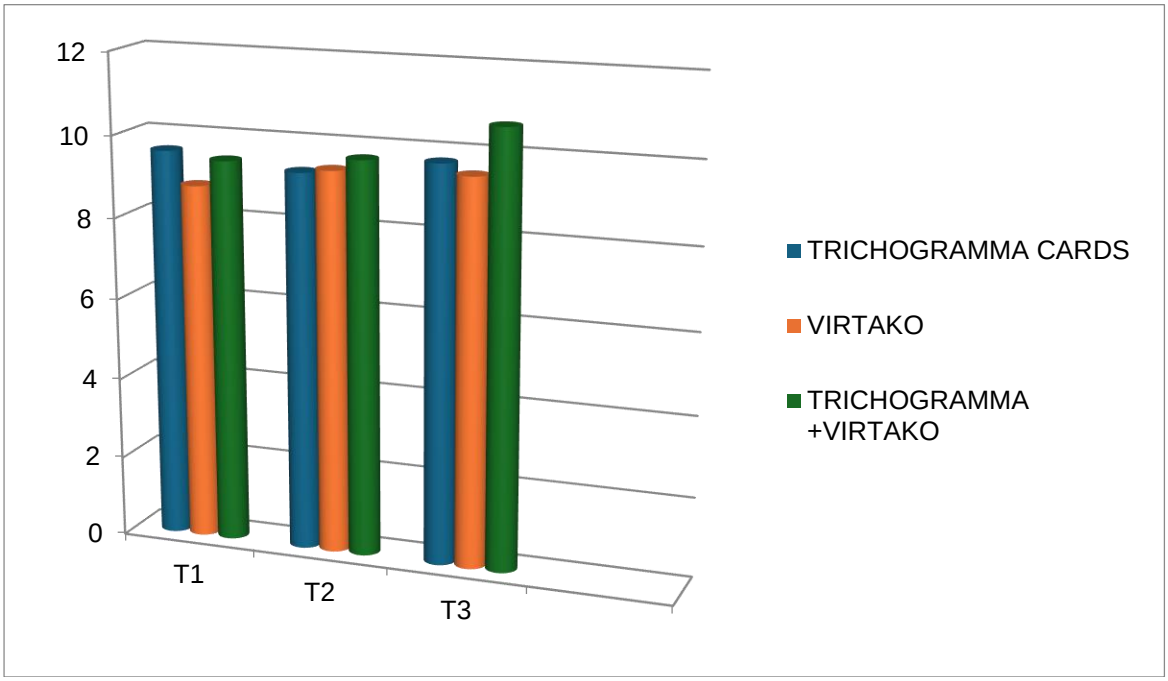


Table 4: Nutrients Management Increase Recovery of sugarcane

Nutrients	Bio fertilizer	Gypsum	Bio-fertilizer + gypsum
T1	9.55	9.30	9.62
T2	9.58	9.76	10.01
T3	10.05	9.86	10.08

Figure 4: Nutrients management increase recovery of sugarcane

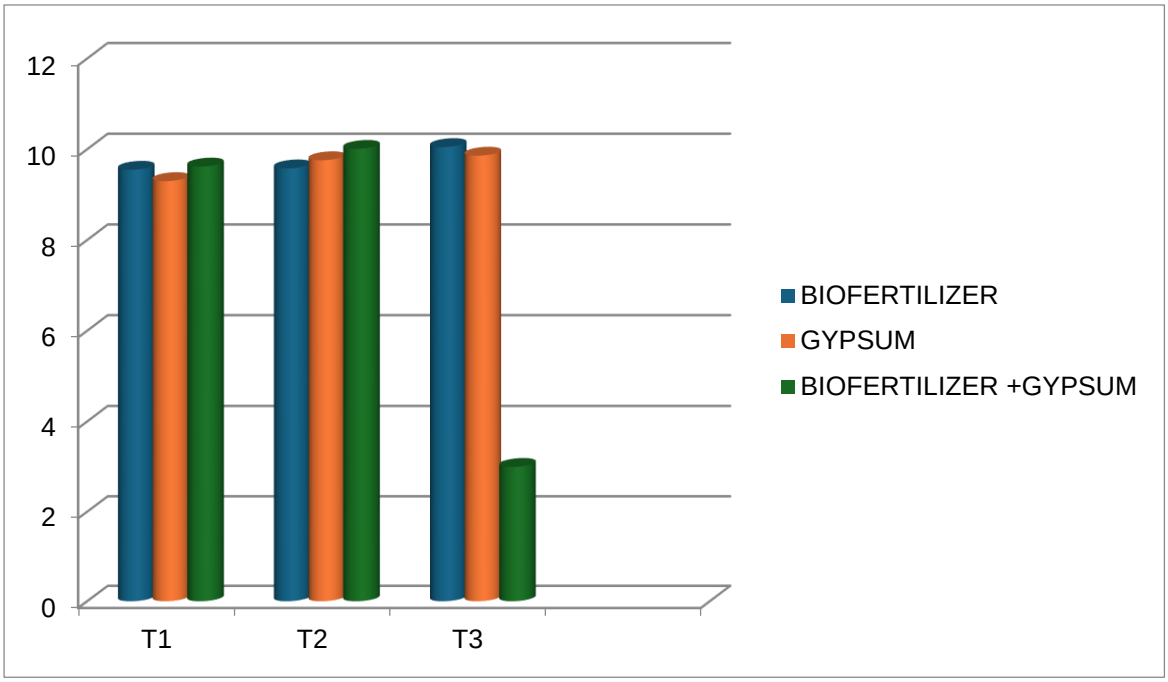


Table 5: Deterioration of cane to decrease Recovery of sugarcane

Loss in Recovery	Factory Loss	Stale cane	Sour cane
T1	7.12	7.63	7.86
T2	7.62	7.78	8.00
T3	7.93	8.38	8.41

Figure5 : Deterioration of cane to decrease Recovery of sugar cane

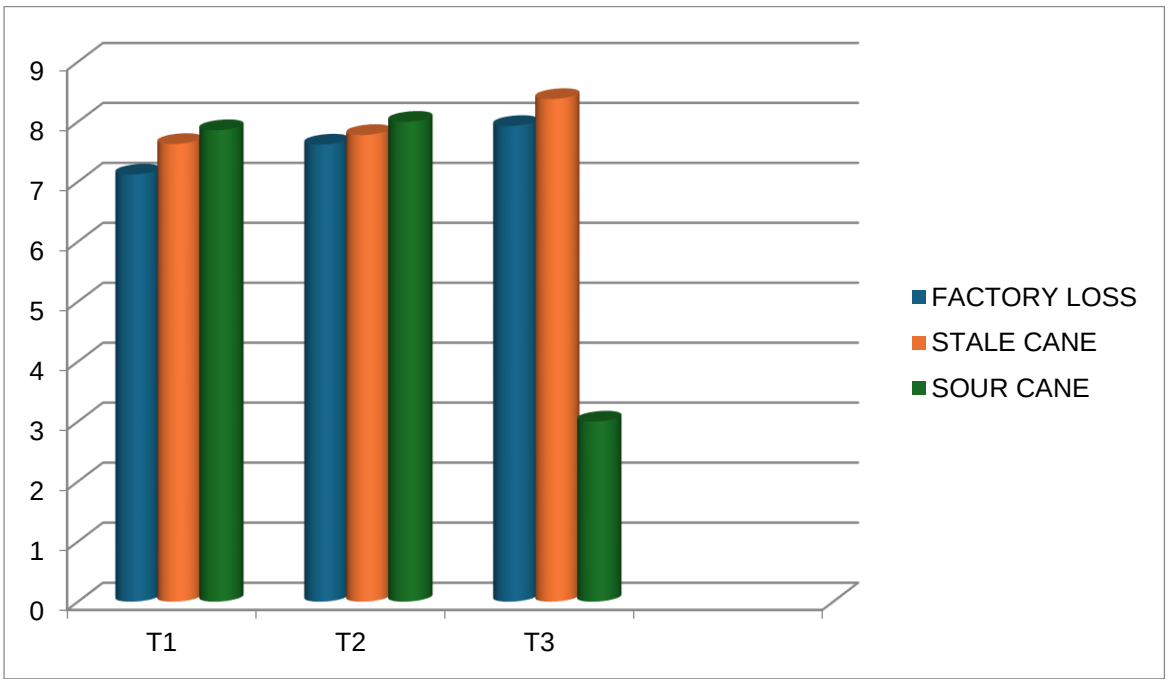
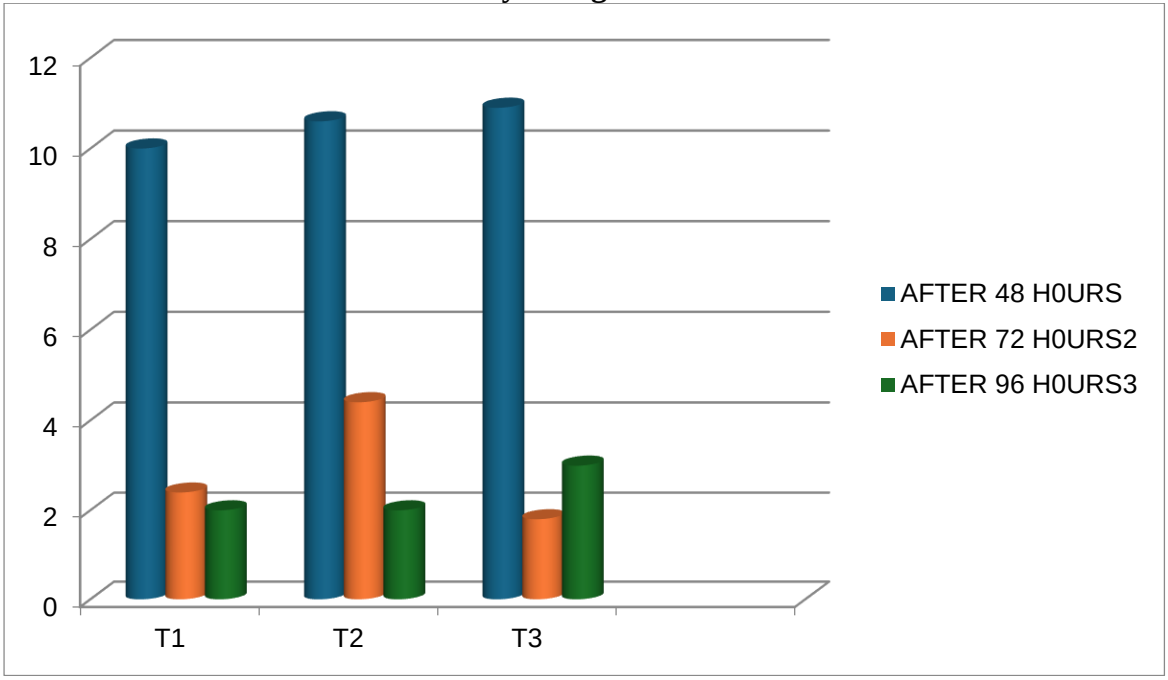


Table 6: Delay in sugar cane crushing harvesting to mill processing to Deterioration of cane after 24 hours decrease Recovery of sugarcane

Varieties	After 48 hours Recovery	After 72 hours Recovery	After 96 hours Recovery
T1	10.0	10.5	10.2
T2	10.6	9	8.79
T3	10.90	9.7	8.8

Figure 6: Delay in sugar cane crushing harvesting to mill processing deterioration of cane after 24 hours decrease Recovery of sugarcane



Conclusions and Recommendations

From sowing to harvesting high management required for enhancing recovery of sugar cane. After harvesting of sugarcane should not be delayed after five days. Harvested sugar cane must be supplied to the mills after 24 hours otherwise the dextran amount is increased from the cut end of the sugar cane sets. Decrease weight of sugar cane as well as quality of cane. The consequent result is economic losses to farmers as well as millers. Based on the findings of many years of study on understanding the causes of deterioration and measures to control it, it is suggested that now there is an urgent need to have specific strategies (state wise or even zone wise in the respective states) and that are in built into policy framework roping in various stakeholders viz., farmers, transporters, extension workers and millers to avoid such losses. Improved sugar recoveries are expected to meet growing sugar demands for the future with same land area allocation for the crop in view of difficulties in expanding it on account of other pressures on cultivable lands.

Novelty Statement

This research had observed 2.8 million acreage of sugarcane and 97% harvested sugarcane delay for supplying to sugar mills decrease in terms yield and quality.

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