SUMMARY

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First study :

Fodder Beet Silage as Effected by Different Cultivars and Potassium Bisulfate Treatment

Fourteen cultivars of fodder beet were ensiled for a varital comparative study. These cultivars were grown in two locations (Sids, and Nubaria).

The fourteen cultivars are listed as follows :
1) Rota 2) Poly aurea 3) Momara 4) Solamka 5) Peramono 6) Solano 7) Solar 8) Polygromingia 9) Maioral 10) Monovert 11) Brigader 12) Monored 13) Kyros and 14) Remilenger cvs.

Sowing was done on the first week of November, 1984 and the harvestig was conducted during the first week of July, 1985.

Completly randomyzed block design for the various cultivars in 4 replications was used.

Pre-ensilage preparation and conditioning using potassium bisulfate-wilting treatment were done as well as water-silting, and freshly ensiled beet for comparison. Combined analysis was done for the two locations.

* Results could be summarized as follows :

1. In summary, the advantages of chemically-wilted compared with water-wilted treatments in respect of the natural characteristics

(colour, ador, foam, and texture) of the produced silage could be due to antioxidant effect of potassium bisulfate during wilting and ensiling as well.

2. Respiratory-fermentation loss was affected by the applied pre-ensiling treatments and the cultivars.

3. Overall of the tested beet-cultivars, respiratory-fermentation loss of the silage was significantly higher for Nubaria than Sids.

4. The interaction effect of the location and cultivars was significant for this loss. In other wards the respiratory-fermentation loss was significantly higher in Nubaria than Sids for same cultivars. Whereas, an opposite trend was noticed in some other cultivars.

5. Effluent loss was higher for the freshly ensiled treatment by 79% than the water-wilted-treatment. And, the effluent loss for the water-wilted treatment was higher by 83% than the chemically-wilted pre-ensiling treatment.

6. Significant effect of the location was detected on the silage effluent loss overall of the tested cultivars, where slightly higher loss was obtained in Nubaria as compared with Sids.

7. There was no significant difference in the net silage weight of water-wilted and the chemically-wilted beet slices over the tested cultivars. However, freshly ensiled beet showed a significant reduction in the net silage weight compared with either water-wilted or chemically-wilted beet slices as a pre-ensiling treatment.

8. Results showed that the ensiled beet cultivars had a significant effect on the net silage weight of the obtained silage.

   Net silage weight was slightly but significantly higher in Sids than in Nubaria.

9. The interaction effect of the cultivars and location on the net silage weight was significant.

10. Respiratory-fermentation loss of the silage was positively correlated with effluent loss with (r= 0.186), and negatively correlated with net silage weight (r= 0.974). However, effluent loss was inversely corelated with the net silage weight (r= 0.401).

11. **Silage of the chemically-wilted treatment had a significant lower pH value than either water-wilted or the freshly packed beet silage. However, there was no significant difference in pH of the two later treatments.**

12. **Results showed significant differences in the pH values of the chemically-wilted beet silage of the different cultivars.**

13. **Freshly ensiled silage had the lowest dry matter percentage and the silage of the chemically-wilted treated silage had the highest dry matter percentage.**

14. **The obtained variation in dry matter percentage among the silage of different beet-cultivars was extremely and significantly different.**

15. **Results showed a significant dry matter superiority of silage in Sids location for some of the tested cultivars. Whereas, opposite significant results were recorded for other cultivars.**

16. Overall of the tested beet-cultivars, pre-ensiling treatment of chemically-wilted beet slices produced the highest total sugars percentage compared with the water-wilted or the freshly ensiled beet.

17. Chemically-wilted silage had a significantly higher total sugars percentage in Sids than in Nubaria.

18. Dry matter percentage of the silage was positively correlated with the total sugars with correlations coefficient of ($r = 0.562$).

19. Pre-ensiling treatment of chemically-wilting produced silage that had significantly higher crude fiber, crude protein and fat percentage compared with the water-wilted silage. These results were over the whole tested cultivars.

20. It is well noticed that the variation in the obtained silage for the different beet cultivars was almost double for crude protein and crude fiber with no much changes in fat percentage. Effects of the interactions between cultivars, locations, and pre-ensiling. treatments on the above contents were studied.

21. Correlation coefficients between the above characteristics were recorded.

22. Acetic acid, Lactic acid Valiric acid and Butyric acid percentages were determined in the produced silage. Higher lactic and valiric acid and lower butyric acid percentage were recorded for the chemically-wilted silage compared with the water-wilted silage.

23. Proper linear regression equations for estimating some quality parameter's values were generated.

Second Study :

Periodical Monitoring of Fodder Beet Silage Characteristics

This study included two fodder beet cultivars "Peramono and Poly-graningia" which were grown in a variety trial for fodder beet cultivar evaluation at Sakha Agricultural Research Station of the Agricultural Research Center, Forage Section, Egypt.

The four replicates of the experiment for each of these cultivars were collected and mixed throughly for obtaining a representative sample for each cultivar.

Sowina was done on the first week of November, 1985 and the harvesting was conducted during the first week of July, 1986.

The already prepared beet slices were chemically treated and wilted as a pre-ensiling treatment. Silage was made enough for monitoring and evaluating the changes in silage quality during the following eight ensiling periods: -4, 7, 14, 28, 42, 56, 70 and 84-days from ensiling.

Experimental design was split plot, where the tested cultivars were in the main plots and sotrage periods in the sub plots in 3 replicates.

Results could be summarized as follows :

1. In general, all of the studied characters turned to be stable with no extra changes after two weeks from ensiling, especially for

colour, smell and texture characters. However, silage colour kept constant for the rest of applied storage periods. This colour was yellowish for Peramono and light brown for Polygroningia beet cultivars. These colours are much relevant to the initial colour of each particular cultivar..

2. Silage of Polygroningia fodder beet cultivar has significantly more respiratory-fermentation loss than Peramono culitvar.

3. Respiratory-fermentation loss increased as the storage time increased with significant differences in same duration intervals.

4. Results showed an elemination of effluent loss of Polygroningia-silage, and the limited effluent production of Peramono cv. silage that were subjected to chemical wilting pre-ensiling treatment.

5. Peramono fodder beet cultivar had slightly higher net silage weight than Polygroningia-silage. Whereas, storage periods were not of great influence on the net silage weight over the two ensiled beet-cultivars.

6. Net silage weight and respiratory-fermentation loss were inversely correlated, with correlations coefficient (r) of 0.878. However, correlation of coefficient between the net silage weight and effluent loss was negative with relatively low r-value (0.321). Also, there was inverse correlation between both of the net silage weight with respiratory-fermentation loss and the effluent loss with (r) value of 0.878 and 0.321, respectively.

7. Peramono silage had significantly lower pH value than Polygroningia.

This difference in pH suddenly showed up at 28 days from ensiling and stayed lower than of Polygrningia up to the end of storage periods.

8. Peramono beet-root slices had higher dry matter percentage than Polygraningia beet right after wilting and before ensiling.

9. No significant difference in the total sugars of the two ensiled beet cultivars over the different storage periods was recorded. However, the different ensiling periods showed a significant difference in total sugars of the obtained silage.

10. pH values slightly increased as the dry matter percentage of the silage decreased. Also, the increase in dry matter percentage of the silage was quite associated with the increase in the total sugars percentage.

11. Generally crude protein, crude fiber or fat percentages of the silage did not show any significant response for either the ensiled beet cultivars or the applied storage periods. Correlations coefficient between the previous components were recorded.

Third Study :

Effect of Various Conditioning Treatments for Three Fodder Beet Cultivars on Silage Quality

This experiment was designed to investigate the effect of 3 different fodder beet cultivars (Polygroningia, Nonoval and Beeta tetra(Main plots), and pre-ensiling treatments: fresh beet slices (F),

beet slices treated by potassium bisulfat only (T-W) and beet slices treated by potassium bisulfat (Pure beet slices (pure), beet slices mixtured with wheat shaff (Mix I) and beet slices mixtured with corn stalks (Mix II)- sub plots.

Split-split plot design was used in 3 replicats. The above fodder beet cultivars were grown in Sakha Experimental Station at Kar-El-Sheich, Agricultural Research Center, Forage Section, Egypt, on the first weeks of Novermber, 1985 and the harvesting was conducted during the first week of July, 1986. These cultivars were selected from a varietal trial experiment through the Forage Research Program.

The results could be summarized as follows :

1. Cultivars did not show any significant effect on the effluent loss of the obtained beet-silage.
2. Significantly higher effluent loss was obtained for either fresh (F) or T-W compared with the chemically treated followed by wilting treatment (T+W).
3. Overall the applied factors, effluent loss was obtained only in pure-beet silage. No effluent loss was produced when beet slices mixed with either wheat-chaff (Mix I) or with shapped corn stalks (Mix. II).
4. Also, pre-ensiling treatment (T+W) had more effect in reducing effluent loss for Monoval then Beeta tetra, followed by Poly-groningia beet-silage, where interaction effect of cultivar x treatment was significant.

5. Ensiling pure beet slices had lower NSW compared to either Mix I or Mix II with no significant difference between mixtures.

6. In general, pH-value of the obtained silage was not varied much according to the applied treatments.

7. Also, slightly lower pH-silage was noticed for the freshly ensiled beet compared with the chemically or chemically-wilted beet in both of the tested mixtures.

8. Silage of Beeta tetra cultivar had margently significant higher dry matter percentage (DM %) than Polygroningia cultivar, whereas Monoval cv. was in between.

9. There was a significant higher DM % for the chemically treated and wilted silage (T + W) than chemically treated without wilting (T - W).

10. Pure silage was much lower in DM % than the other mixtures with either wheat chaff or chopped stalks.

11. Pure beet silage had significantly hihger total sugars than either of the mixed ones with no difference in between.

12. The interaction effect of cultivars x pre-ensiling treatments on the total sugars of the silage was significant. The difference in total sugars of the silage due to (T + W) and (T - W) treatments was muds higher for Beeta tetra and Monoval than Polygroningia cv.

13. No differences in silage total sugars were obtained due to mixuture variations using any of the applied pre-ensiling conditions.

14. Crude protein, crude fiber, and fat contents of the obtained silage were determined and studied.

Fourth Study :

Effect of Fodder Beet Cultivars and some Fertilizer Treatments on Silage Making.

Experiments were applied in Sids and Nubaria, sowing was done on the fisrst week of November, 1984 and the harvesting was conducted during the first week of July, 1985, combined analysis was also conducted as well.

Four cultivars of fodder beet were selected and used in this study;

1) Rota 2) Polyaurea 3) Polygroningia and 4) Peramono.

Each of these cultivars were supjected to 4 fertilizer treatments as follows: Control; A= 50 kg N + 75 kg K_2O/fed after thining + 50 kg N 30 days later; B = 50 Kg N+100 kg K_2O/fed after thining + 50 kg N 30 days later; C = 50 Kg K_2O/fed after thining + 50 kg K_2O 30 days later.

Split plot design was used having cultivars in the main plots and fertilizer treatments randomly distributed in the subplots.

Results could be summarized as follows :

1. Natural characteristics of the obtained beet-silage were much better for the chemically-wilted beet than the (control) water-wilted -ilage or the freshly packed silage. Results were true for either the tested beet cultivars or the imposed fertilizer treatments that were applied.
2. Polygroningia and Rota cv. had significantly lower respiratory-fermentation loss than Peramono and Polyaurea cv.

3. Silage of cultivars received no fertilization treatments had the lowest respiratory-fermentation loss.

4. Over the two locations, silage of Polygraningia cv. did not produce any effluent whereas Polyaurea cv. produced the highest effluent loss with a significant difference.

5. Overall of the applied treatments effluent loss of the silage was significantly higher in Nubaria than in Sids.

6. The net silage weight of the different cultivars could be arranged in the following descending order: Polygraningia - Rata - Peramono. Polyaurea cvs.

7. Interaction of cultivars and locations on the net silage weight was significant. Polygraningia cv. produced the maximum net silage weight, being hihger in Sids than in Nubaria at the control and any of the applied fertilizer treatments.

8. Silage pH-values were significantly higher for all of the tested cultivars in Nubaria than in Sids.

9. Much higher pH silage was obtained for Rota, Polyaurea, and Peramono cv. in Nubaria than in Sids without fertilization.

10. Rota, Polyaurea, and Polygraningia cvs. produced silage of higher dry matter percentage in Sids than in Nubaria especially for the last cultivar however, Peramono cv. reacted extremely different in this respect.

11. Any of the tested cultivars had produced silage of significantly higher total sugars in Sids than Nubaria with highest values for Polygraningia followed by Peramono, then Rota follwed by Polyaurea cv.

12. Also, significantly higher total sugars of silage were obtained in Sids compared with Nubaria at the control and any of the applied fertilizer treatments.

13. Correlations coefficients between, respiratory-fermentation loss, effluent loss and net silage weight were investigated.

14. pH of the silage was slightly lower and proper for the chemically-wilted as compared with the water-wilted treatment.

15. Dry matter percentage of chemically wilted silage was higher than for the water-wilted treatment.

16. Crude protein, crude fiber, and fat percentages in the produced silage were determined. And, correlation coefficient between these parameters were studied .

17. Acetic acid was much higher for the chemically-wilted silage than the water-wilted silage. This fatty acids varied according to the ensiled cultivars. The order of cultivars according to their acetic acid content was: Polyaurea - Rota - Peramono - Polygroningia.

18. Valeric acid was twice higher in the silage of chemically-wilted treatment compared to the water-wilted treatment. This acid was higher for Rota-silage, then Polygroningia, then Polyaurea and finally Peramono.

19. Results showed that butyric acid of the water-wilted silage was twice as that of the chemically-wilted. And the variation in butyric acid content of the silage was not much affected by the cultivars or the fertilizers factors.