

EFFECT OF PRE-TREATMENT OF LEMONGRASS (*CYMBOPOGON FLEXUOSUS*, STAFFS ON THE YIELD AND CITRAL CONTENT OF OIL

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Lemongrass is an aromatic perennial crop grown extensively in Kerala and the oil distilled from the leaves and shoots has high commercial value. The quality of the oil is mainly judged on the basis of citral content. The effect of pre-treatment of the grass by way of chopping and wilting has not been studied so far even though wilting the grass prior to distillation is a common practice followed by the cultivators. These investigations were taken up with a view to finding the effect of these treatments on the quality and quantity of the oil.

Materials and Methods

The experiment was conducted for 4 years from 1963-64 at the Lemongrass Research Station, Odakkali. An improved strain of lemongrass evolved at the Odakkali Station viz, OD. 19 was used for the study. The experiments consisted of 4 wilting treatments (distilling fresh grass, and distilling 48, 96, and 144 hours after harvest) and 4 chopping treatments (distilling unchopped grass and those chopped to 3, 10 and 20 cm. lengths). Grass sufficient for 16 distillation; (at the rate of 15 kg per distillation) were taken from a bulk harvest. The entire lot was mixed well and 4 random samples (each 60 kg) were selected which formed the 4 wilting treatments. Each of these 4 lots were again subdivided into 4 samples weighing 15 kg each which formed the 4 chopping treatments under each wilting treatment. Thus altogether there were 16 treatments. The grass was harvested from the same area at 40-45 days interval, the first harvest commencing in the month of June with the onset of the rains. During the period from January to May when dry weather prevailed, no harvest was done. Altogether 5 harvests were obtained each year and taking each harvest as a replication, the trial was thus replicated 5 times and continued for 4 seasons. The oil yield and citral content of oil from each sample were studied. Estimation of 'citral' was done by the bisulphite method.

Results and Discussion

The data on the yield of oil and citral content are presented in Tables 1 and 3 respectively.

Table I. Mean oil yield of lemongrass (ml) for the different chopping and wilting treatments

Chopping treatments	Wilting treatment				Men for chopping treatments
	No wilting fresh grass distilled	48 hours wilting after harvest	96hours wilting after harvest	144 hours wilting after harvest	
	D₁				
Grass chopped to 3 cm lengths	82.94	83.75	80.75	77.47	81.23
Chopped to 10 cm lengths	75.52	79.75	79.56	74.72	77.39
C₂ Chopped to 20 cm lengths	72.25	73.72	75.03	69.42	72.73
No chopping	61.75	64.69	66.78	62.39	63.90
Meanforwilting treatments				71.00	

C. D. (0.05) for comparison between wilting treatments - 2.71
 C. D. (0.05) for comparison between chopping treatments -1.58

There was **significant** increase in oil yield due to chopping and **wilting** of the grass. Among the wilting treatments, grass wilted for 96 hours after harvest recorded highest oil yield but the difference between 48 hours and 96 hours was not significant. Among the chopping **treatments**, grass chopped to 3 cm lengths recorded significantly higher oil yield than all other treatments. The chopping treatment was found to have a direct bearing on the oil yield, the smaller the size to which grass was cut higher being the recovery of oil. It was **also** found that in the case of chopping treatments for smaller lengths namely 3 and 10 cm, the oil yield was less when grass wilted for 96 hours was used as against 48 hours wilted grass (**C1 D3** and **C2 D3** as against **C1 D2** and **C2 D2**) whereas in the case of **'20 cm. chopping'** and **'without chopping'** treatments the yield was better

increase in oil yield or citral content *due* to wilting or drying of the grass. The increase in oil yield obtained in this experiment due to wilting for 48 to 144 hours may be explained by the fact that during the initial stages of wilting, the grass retains a large amount of moisture in the cells which by diffusion carries the oil to the surface and aids in its extraction. Wilting also makes the cell wall membranes more permeable facilitating higher recovery of oil. The increase in oil yield due to chopping was due to the fact that the extraction of oil became easy through the cut ends. Significant increase in the citral percentage was noticed due to chopping treatments, smaller the size greater being the percentage of citral. Wilting the grass also increased the citral percentage; the highest recorded citral content being recorded when wilted for 96 hours. The fact that the oil yield and citral content of oil increased when the grass was allowed to wilt for 48 to 144 hours and suitably chopped suggest that this may be adopted as an important step in distillation since it reduces the expenditure for distillation.

Table 3. Citral percentage in the oil for the different wilting for chopping treatments

Treatments	Wilting treatments				chopping treatments
	No wilting	48 hours wilting	96 hours wilting	144 hours wilting	
Chopped 3 cm C,	86.44	88.71	88.81	88.38	88.08
Chopped to 10 cm C	85.84	87.11	88.28	87.96	87.30
Chopped to 20 cm	85.71	86.58	88.83	88.52	87.41
No chopping C	83.07	84.88	87.24	87.14	85.57
Mean for wilting treatments	85.27	86.82	88.29	88.00	

CD (0.05) for comparison between chopping treatments — 1.00

when the grass was wilted for 96 hours. This was because when the grass was cut for smaller length wilting for 96 hours caused some loss of oil. Another advantage of wilting the grass was by way of reduction in volume and weight. There was a reduction of 10 percent when the grass was wilted for 48 hours and a further reduction of 6 to 7 percent in the next 48 hours which facilitated packing of more grass for distillation. It was also found that when the grass was wilted and chopped before distillation there was quicker recovery of oil as seen from the Table 2.

Table 2. Time takers for the recovery of oil for each treatment

Chopping treatments	Wilting treatments				Chopping treatments
	No wilting fresh grass distilled	48 hours wilting after harvest	96 hours wilting after harvest	144 hours wilting after harvest	
Grass chopped to 3 cm lengths C ₁	1 hr 30 mts	1 hr 15 mts	1 hr 13 mts	1 hr 5 mts	1 hr 16 mts
Chopped to 10 cm lengths C ₂	1 ,, 30 ,,	1 ,, 33 ,,	1 ,, 30 ,,	1 ,, 28 ,,	1 ,, 30 ,,
Chopped to 20 cm lengths C ₃	1 ,, 45 ,,	1 ,, 45 ,,	1 ,, 35 ,,	1 ,, 38 ,,	1 ,, 41 ,,
No chopping C ₄	1 ,, 48 ,,	1 ,, 48 ,,	1 ,, 38 ,,	1 ,, 43 ,,	1 ,, 44 ,,
Mean for wilting treatments	1 ,, 38 ,,	1 ,, 35 ,,	1 ,, 29 ,,	1 ,, 29 ,,	

When the difference between the 'no wilting' and 'wilting treatments' was only 3 to 9 minutes, there was a saving of about half an hour due to chopping to 3 cm. size over the 'no chopping' treatment.

The increase in oil yield obtained due to drying was not in conformity with the results obtained by Hood (1917), Arrillage, Colon Rivera and Jones (1944) and with the results obtained in Puerto Rico Experimental station as reported by Guenther. They did not find any

Summary

A study on the **pre-treatment** on **lemongrass** by way of wilting and chopping before distillation showed that increased oil yield and citral content could be obtained by wilting and chopping the grass after harvest. This also facilitates the packing of more grass into the still. A combination of these two pre-treatment methods prior to distillation will be a better way for higher recovery of quality oil.

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