

Genotypic Variation for Oil Content and its Quality in Lemongrass Germplasm

PK Verma, MK Deen, SN Gupta and CS Tyagi

Medicinal, Aromatic and Under-utilized Plants Section, Department of Plant Breeding, CCS Haryana Agricultural University, Hisar-125004, Haryana

Lemongrass is an important essential oil bearing aromatic grass. It consists of different species viz.- *Cymbopogon flexuosus* Staf. (East Indian type), *Cymbopogon pendulus* (Jammu type), *Cymbopogon citratus* (West Indian type) and *Cymbopogon khasianus*. Different species vary with regards to chemical composition of the essential oil. The essential oil is a source of an aromatic chemical citral, which is precursor for synthesizing α -ionone (used in perfumery, flavouring and cosmetic industries) and β -ionone (used in manufacture of vitamin A). Besides, lemongrass essential oil has insecticidal, bactericidal and medicinal properties, while dried leaves are used in herbal teas. India had important position in International market earlier in exporting lemongrass oil to the tune of 18000 tons. Therefore, thorough screening of available materials of lemongrass for oil quality is an important aspect to deal in by the researchers.

Twelve (12) genotypes of lemongrass collected from different parts of the country are maintained vegetatively at the experimental area of the Medicinal and Aromatic Plants section in the Department of Plant Breeding. Different genotypes were harvested and oil quantity and oil quality was estimated during the cut

taken in July, 1998. Oil quantity was estimated on basis of one kilogram freshly harvested herb sample through Calevanger's apparatus. The oil quality was analysed through gas chromatography (GC) for chemical composition of the oil on the basis of geraniol, geranyl acetate, geranial and citral content in freshly extracted oil.

Wide range of variability was recorded for all the characters under study (Table 1).

Oil contents (%): The oil content on fresh weight basis varied from 0.16 to 0.70%. The highest oil content was recorded for the variety CKP-25 (0.70%), followed by RRL-82 (0.56%), HL-3 (.036%), RRL-16 (.34%), HL-2(0.32%), and HL-9 (0.30%). The remaining genotypes yielded lower oil content i.e. less than 0.30%.

Geraniol content: It ranged from 1.2 to 31.6%. HL-9 recorded the highest geraniol content (31.6%), followed by HL-1 and HL-2 (12.8%), RRL-82 (7.8%), RRL-16 (6.3%) and CKP-25 (4.0%).

Geranyl Acetate (%): It varied between 0.7 to 9.8%. The highest contents was recorded for HL-10 (9.8%), followed by CKP-25 (7.3%), HL-1 (7.0%) and HL-2 (6.9%).

Table 1. Oil content and its chemical composition in lemongrass germplasm

S.No.	Genotypes	Oil content* (%)	Geraniol content (%)	Geranyl acetate (%)	Geranial/ Citral 'a' content (%)	Neral content (%)	Citral content (%)	Total (%)
1.	RRL-16	0.34	6.3	3.0	42.3	30.0	72.3	81.6
2.	RRL-82	0.56	7.8	7.0	6.8	29.4	74.1	86.7
3.	HL-1	0.18	12.8	7.0	6.8	2.3	9.1	28.9
4.	HL-2	0.32	12.8	6.9	6.8	2.5	9.3	29.0
5.	HL-3	0.36	2.2	1.5	47.3	32.3	79.6	83.3
6.	HL-4	0.25	3.7	0.7	39.8	29.3	69.1	73.5
7.	HL-6	0.22	3.3	0.7	43.9	30.9	74.8	77.8
8.	HL-7	0.20	1.2	2.3	5.7	1.6	7.3	10.8
9.	HL-8	0.26	3.7	0.8	42.8	30.3	73.1	77.6
10.	HL-9	0.30	31.6	4.5	15.5	1.2	16.7	52.8
11.	HL-10	0.16	2.6	9.8	15.4	1.4	16.8	29.2
12.	CKP-25	0.70	4.0	7.3	42.8	30.1	72.9	84.2
	Mean	0.32	7.7	4.1	29.5	18.4	-	-
	Range	0.16 - 0.70	1.2-31.6	0.7-9.8	5.7-47.3	1.2-32.3	7.3-79.6	-

* Oil content on fresh weight basis

Geranial or Citral 'a' content (%): It is the major constituent of lemongrass oil. It ranged from 5.7 to 47.3%. The promising genotypes were HL-3 (47.3%), RRL-82 (44.7%), HL-6 (43.9%), HL-8 and CKP-25 (42.8%), RRL-16 (42.3%) and HL-4 (39.8%).

Neral or citral 'b' content (%): It is the next important constituent of the lemongrass oil. It varied from 1.2 to 32.3%. The highest citral 'b' or neral content was found in HL-3 (32.3%), followed by HL-6 (30.9%), HL-8 (30.3%), CKP-25 (30.1%) and RRL-16 (30.0%).

Citral (Geranial + Neral) content (%): It ranged from 7.3 to 79.6%. HL-3 recorded the highest citral content (79.6%), followed by HL-6 (74.8%), RRL-82 (74.1%), HL-8 (73.1%), CKP-25 (72.9%), RRL-16 (72.3%) and HL-4 (69.1%).

The four constituents under study generally constitute the major portion of the lemongrass oil quality. The total composition of freshly extracted essential oil from lemongrass based on these four constituents ranged between 10.8 to 86.7%, indicating that the genotypes with lower total may have constituents other than geranial and neral contents. Genotypes RRL-82 (86.7%), CKP-25 (84.2%), HL-3 (83.3%), RRL-16 (81.6%), HL-6

(77.8%), HL-8 (77.6%) and HL-4 (73.5%) have geranial and citral as the major components. Hence, these genotypes except RRL-82, RRL-16 (*C. pendulus*) and CKP-25 (*C. khasianus* × *C. pendulus*) may belong to one species i.e. *C. flexuosus* (Maheshwari, 1995). Genotypes HL-1, HL-2 and HL-10 with lower content of geranial and neral may belong to another species. HL-9 (31.6% geraniol) and HL-7 may belong to two different species. Bhattacharya *et al.* (1998) also reported that freshly distilled oil from lemongrass (*C. flexuosus*) contained higher concentrations of geranial (53.11%) and neral (33.21%), which is the quality of good lemongrass oil. The present investigation thus revealed the presence of enough genetic variability in the available genotypes of lemongrass from quality point of view.

References

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Status of Resistant Germplasm in Tobacco and *Nicotiana* Species

RVS Rao, T Venkateswarlu, K Sarala and TGK Murthy

Division of Crop Improvement, Central Tobacco Research Institute, Rajahmundry-533105, Andhra Pradesh

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In India, *Nicotiana tabacum* and *N. rustica* are the two important tobacco species that are widely cultivated and consumed in various forms. Depending upon use and the method of curing, tobacco has been classified into 9 different types viz.- FCV (Flue Cured Virginia), burley, bidi, chewing, cheroot, natu, hookah, snuff and cigar (wrapper and filler).

In most of the tobacco growing countries including India, pest and pathogen continue to be a major problem in its cultivation, storage and processing. Tobacco is attacked by a number of diseases and insect pests during various stages of crop growth resulting in considerable yield losses. Among the insect pests aphid, leaf eating caterpillar, budworm and white fly and among pathogens

tobacco mosaic virus (TMV), black shank and nematodes are economically important.

The responsibility for collection, conservation, maintenance and characterization of tobacco germplasm in India lies with the Central Tobacco Research Institute (CTRI), Rajahmundry, which is also designated as National Active Germplasm Site (NAGS) under the National Network on Conservation for Plant Genetic Resources. At present, a total of 1847 germplasm accessions are being maintained and evaluated for morphology, yield, physical and chemical characteristics of leaf, and disease/pest resistance. At CTRI, sources of resistance have been identified in the tobacco germplasm for various diseases viz.- TMV (313 lines), TDV (35), TEV (10),