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Indrajeet Shekhar
Department of Agroforestry, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad, Uttar Pradesh, India

Sameer Daniel
Department of Agroforestry, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad, Uttar Pradesh, India

Puja Kishore
Department of Agroforestry, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad, Uttar Pradesh, India

Azad Kumar Singh
Department of Agroforestry, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad, Uttar Pradesh, India

Animesh Kanaujia
Department of Agroforestry, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad, Uttar Pradesh, India

Correspondence
Animesh Kanaujia
Department of Agroforestry, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad, Uttar Pradesh, India

Impact of fertilizer dose and spacing on oil yield of Japanese mint (*Mentha arvensis* L.) var. Sarj

Indrajeet Shekhar, Sameer Daniel, Puja Kishore, Azad Kumar Singh and Animesh Kanaujia

Abstract
Because of expanding market for high value rich crops, opportunities have increased for the production of medicinal herbs. A field experiment at the Sam Higginbottom Institute of Agricultural, Technology and Sciences during 2015-16 to study the impact of fertilizer dose and spacing on oil yield of Japanese mint (*Mentha arvensis* L.) var. Sarj. The total herbage weight (fresh and dry) per hectare and oil yield (kg/ha) were taken after final harvesting. The total fresh and dry herbage weight was observed better in spacing 60X60 cm with fertilizer doses of N_{100}, P_{140}, K_{80}. The maximum oil yield (kg/ha) was found in treatment T_2 (149.67 kg/ha) followed by treatment T_6 and T_9 (132.33 kg/ha) under spacing 30X30cm and minimum was observed in T_2 (108.67 kg/ha).

Keywords: *Mentha arvensis*, spacing, fertilizer, fresh and dry herbage, oil yield

Introduction
Mentha species are known from time immemorial as kitchen herbs. Mint is the world's third most valuable flavouring agent, being exceeded in popularity by vanilla and citrus flavours. Japanese mint (*Mentha arvensis* L.) is an important essential oil bearing crop of India and its oil is a natural source of menthol which is widely used in pharmaceutical and cosmetic preparations. Mint is the common name *Mentha arvensis* having approximately 25 species of the genus Mentha belonging to family Lamiaceae. Mentha (*Mentha arvensis*), a medicinal and aromatic plant, is a perennial herb with numerous stiff stem arising from rhizomatous root. Menthol mint is the most popular species commercially cultivated in India. In India, Menthol mint is cultivated in tarai and central regions of Uttar Pradesh, Punjab and Haryana, where it has proved a boon to growers and fitted well in some of the existing cropping systems (Chand *et al*., 2004) [2]. The oil composition and yield may vary under different agro climates, soil conditions and nutrient application (Duhan and Gulati, 1975) [3]. Different mint species often contains 40-85% menthol as major constituent but the Mentha arvensis have 80-85% menthol contents (Ozguven and Kirici, 1999) [15].

Materials and Methods
A field study was conducted at the research area of a Department of Forestry, Sam Higginbottom Institute of Agricultural, Technology and Sciences, (Deemed to be University), Allahabad (UP) during the period February, 2015 to June, 2015. The medicinal plant *Mentha arvensis* L. var. Sarju was procured from Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow (UP). In three treatments such as T_1, T_5 and T_9 there were no fertilizer used i.e. in control from where as in rest nine treatments i.e. T_2, T_6, T_{10} =25 kg/ha, 35 kg/ha, 20 kg/ha, T_3, T_7, T_{11} = 50 kg/ha, 70 kg/ha, 40 kg/ha, and T_4, T_{12} = 100 kg/ha, 80 kg/ha. Nitrogen was applied in the form of urea in three equal splits, full dose of Phosphorus in the form of single super phosphate (SSP) and Potash as sulphate of potash were applied ate the time of planting. The different post harvesting observations such as Total herbage weight (fresh and dry) per hectare and oil Yield (kg/ha) were taken after final harvesting i.e. at 120 DAT. The statistical analysis was done by data analysis tool package of Excel (MS office 2007 package).

Result and Discussion
It was observed from the experiment that the total fresh herbage weight (q/ha) was did not significantly affected by the treatments while it was varied from 221.67 q/ha to 236.33 q/ha. While the total dry herbage weight (q/ha) was significantly affected by the treatments and it was varied from 50.60 q/ha to 62.33 q/ha. The maximum total fresh herbage weight (q/ha) was found treatment T_5 (236.33 q/ha) followed by treatment T_6, T_9 and T_{10} (235.67 q/ha) and

minimum was observed in T_1 (221.67 q/ha) while the maximum total dry herbage weight (q/ha) was found in treatments T_1 (62.33 q/ha) followed by treatment T_8 (59.97 q/ha) and minimum was observed in T_9 (50.60 q/ha). The oil yield (kg/ha) was significantly affected by the treatments while it was varied from 108.67 kg/ha to 149.67 kg/ha. The oil yield (kg/ha) was found maximum in treatment T_2 (149.67 kg/ha) followed by treatment T_6 and T_9 (132.33 kg/ha) and minimum was observed in T_2 (108.67 kg/ha) as depicted in table 1 and figure 1.

Table 1: Effect of spacing and fertilizer concentration on fresh and dry herbage weight and oil yield of *Mentha arvensis.*

Treatment No.	Treatment	Total fresh herbage weight (q/ha)	Total dry herbage weight (q/ha)	Oil yield (kg/ha)
T_1	S_1 X F_1	221.67	62.33	123.33
T_3	S_1 X F_2	231.00	56.73	108.67
T_4	S_1 X F_3	230.00	52.77	132.00
	S_1 X F_4	230.00	55.10	126.33
T_5	S_2 X F_1	236.33	58.27	149.67
T_6	S_2 X F_2	235.67	59.80	132.33
T_7	S_2 X F_3	232.67	58.73	127.33
T_8	S_2 X F_4	234.00	59.97	117.00
T_9	S_3 X F_1	235.67	50.60	132.33
T_{10}	S_3 X F_2	235.67	58.53	132.00
T_{11}	S_3 X F_3	233.00	53.47	128.67
T_{12}	S_3 X F_4	233.00	51.67	126.00
S. EM. (±)		5.085	2.107	4.542
C.D (5%)		NS	6.150	13.258
CV %		18.568	31.646	30.116

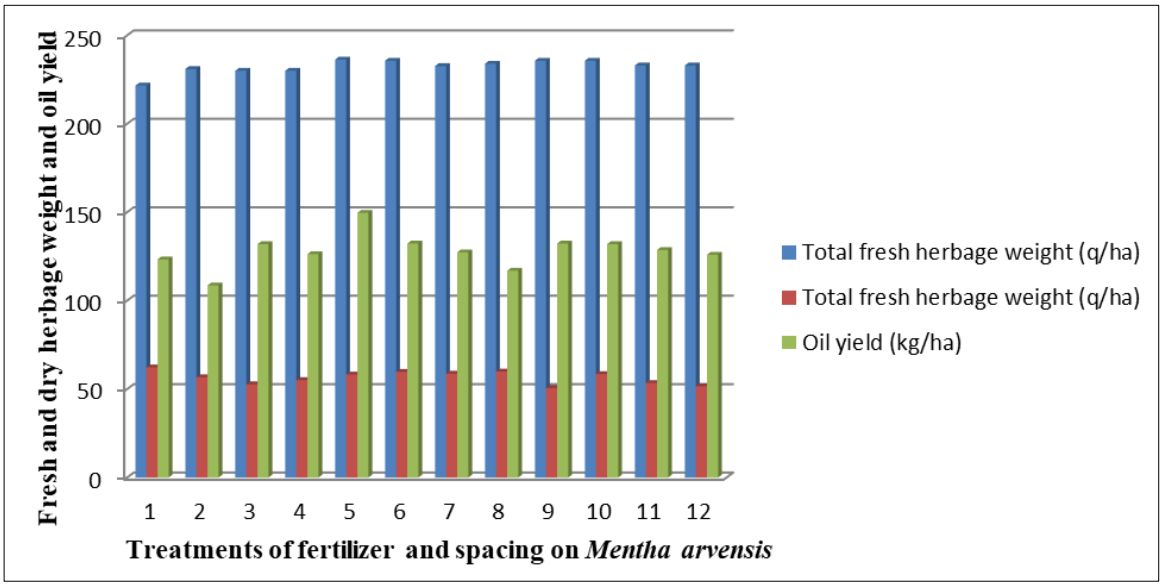

Fig 1: Effect of spacing and fertilizer concentration on fresh and dry herbage weight and oil yield of *Mentha arvensis*

It is due to fact that higher application of N fertilizers resulted in decreased in oil production as reported by Munsi (1992) [14]. Many scientists have been reported that mint oil yield become reduced at higher rate of N application (Bhardwaj *et al*., 1979; Patra *et al*., 2001; Ram *et al*., 2006) [1, 16, 4].

Conclusions

The results accrued from this investigation, the total fresh and dry herbage weight was observed better in spacing 60X60cm with fertilizer doses of N_{100}, P_{140}, K_{80} and the oil yield (kg/ha) was found maximum in spacing 30X30cm with fertilizer doses of N_{25}, P_{35} and K_{20}.

References

1. Bhardwaj, Katoch PC, Kausal AN. Effect of different level of nitrogen on herb yield and essential oil content in Mentha species. Indian Journal of Forestry. 1979; 2(1):27-30.
2. Chand SNK, Patra Anwar M, Patra DD. Agronomy and uses of Menthol mint (Mentha arvensis)- Indian perspective. Pro. Indian Natl. Sci. Acad. 2004; 3:269-297.
3. Duhan SPS, Gulati BC. Essential oil of Mentha citrate Ehrh. Paper presented for VI International Congress of Essential oils held at California during, 1974.
4. Ram D, Muni R, Singh R. Optimization of water and nitrogen application to menthol mint through sugarcane trash mulch in a sandy loam soil of semi–arid sub-tropical climate. J Bio. Tec. 2006; 97:886-893.
5. Imai H, Osawa K, Yasuda H, Hamashima H, Arai T, Sasatsu M. Inhibition by the essential oils of peppermint and spearmint of the growth of pathogenic bacteria. Microbios, 2001; 106:31-39.
6. Ireland RC. Experimental Statistics for Agriculture and Horticulture. United Kingdom: Cambridge University Press, 2010. ISBN 978-1-84593-537-5.
7. Jackson ML. Soil chemical analysis. Prentice Hall of India Pvt. Ltd., New Delhi, 1973; 38-82.
8. Jaiswal VP, Singh JP, Singh K. Production potential and profitability of some potato based cropping sequences in north – western plains; Proc. National Symp. Modipuram, India. 1993-1994.

9. Jalota SK, Singh S, Chahal GBS, Ray SS, Panigraghy S, Bhupinder-Singh, *et al*. Soil texture, climate and management effects on plant growth, grain yield and water use by rainfed maize–wheat cropping system: Field and simulation study. Agricultural Water Management. 2010; 97:83-90.
10. Jan S, Khan AM, Uddin S, Murad W, Hussain M, Ghani A. Herbal remidies used for gastrointestinal disorders in Kaghan Valley, Pakistan. Pak. J Weed Sci. Res. 2008; 14(3-4):169-200.
11. Janaki Ammal EK, Sobti SN. The origin of Japanese mint; Curr. Sci. 1962; 31:387-388.
12. Kumar V, Sood M. Effect of transplanting time, spacing and fertilizers on herbage and oil yield of *Mentha piperita L*. Intl. J Farm Sci. 2011; 1:68-74.
13. Lacy ML, Stephens CT, Green RJ, York AC. Mint Production in the Midwestern United States. NCR Publication #155. 1981, 18 pp.
14. Munsi PS. Nitrogen and Phosphorus nutrition response in Japanese mint cultivation, Acta Hort. 1992; 306:436-443.
15. Ozguven M, Kirici S. Research on yield, essential oil, contents and components of mint species in different ecologies. Turk J Agric For. 1999; 23:465-472.
16. Patra NK, Tanveer H, Khanuja SPS, Shasany AK, Singh HP, Singh VR, *et al*. A unique inter specific hybrid spearmint clone with growth properties of *Mentha arvensis* L. And oil qualities of *Mentha spicata* L. Theor. Appl Genet. 2001; 102:471-476.
17. Sameer Daniel, Puja Kishore, Animesh Kanawjia. Role of mulching and varietal influence on Brinjal (*Solanum melongena*) in alley cropping system. Journal of the Kalash Science. 2016; 4(2):17-19.