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Effect of nutrient management and plant growth regulator on growth, herbage yield, oil yield and economics of patchouli (*Pogostemon cablin*) under Chhattisgarh plain ecosystem

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Abstract
Aromatic crops are gaining importance as economically more lucrative crops than many traditional agricultural crops in different agro-ecosystems. Patchouli crop is a long duration aromatic crop. Patchouli oil is hence an important ingredient in many fine fragrance products such as perfumes, as well as in soaps and cosmetic products. There is need to optimum nutrient management practices and plant growth hormone levels for optimum growth, oil yiled of patchouli The experiment treatments were divided into ten treatment in randomized block design with three replications under All India Coordinated Research Project on Medicinal and Aromatic plants, Raipur centre. The treatments comprised of control (T_1-RDF: 150:50:50 kg NPK ha^{-1}), 100:50:50 kg ha^{-1} NPK + 2.5 t ha^{-1} vermicompost (T_2), T_1 + 20 ppm NAA, T_1 + 30 ppm NAA, T_1 + 20 ppm GA, T_1 + 30 ppm GA, T_2+20 ppm NAA, T_2+30 ppm NAA,T_2+20 ppm GA and T_2+30 ppm GA. Maximum mean plant height (93.27cm), herbage yield (16.18 q/ha) and oil yield (36.96 kg/ha) were found with application of 100:50:50 kg ha^{-1} NPK + 2.5 ton ha-1 vermi compost + 20 ppm GA which was superior over application of 100:50:50 kg ha^{-1} NPK + 2.5 ton ha^{-1} vermi compost + 30 ppm GA, 100:50:50 kg ha^{-1} NPK + 2.5 ton ha^{-1} vermi compost + 30 ppm NAA, 100:50:50 kg ha^{-1} NPK + 2.5 ton ha^{-1} vermi compost + 20 ppm NAA. The application of 100:50:50 kg ha^{-1} NPK + 2.5 ton ha^{-1} vermicompost +20 ppm GA gave highest mean net return (Rs.43,086 ha^{-1}) followed by 150:50:50 kg ha^{-1}+ 30 ppm GA (Rs 42,106/ha).

Keywords: Patchouli, nutrient management, plant growth regulator, oil yield, economics

Introduction
Patchouli (*Pogostemon cablin*, Benth) is one of the essential oil-producing plants of the Labiatae family. The dry leaves of patchouli on steam distillation yield an essential oil called the patchouli oil. Patchouli oil is hence an important ingredient in many fine fragrance products such as perfumes, as well as in soaps and cosmetic products. Many plants have become endangered or vulnerable or threatened as 90% collection of medicinal plants is from wild source and 70% collection involved destructive harvesting (GoI, 2000) [2]. Aromatic crops are gaining importance as economically more lucrative crops than many traditional agricultural crops in different agroecosystems due to the increased demand for herbal based aromatic products. As a result, aromatic crops are replacing traditional food crops in certain areas, while they have been incorporated in modified cropping system in other areas. Introduction of highly profitable aromatic crops into the existing cropping system without completely replacing the traditional crop is strategy that acquiring acceptance in India (Rajeshwar et al., 2000) [4].

Material and Methods
Patchouli crop is a long duration aromatic crop. There is need to nutrient management practices and plant growth hormone levels for optimum growth, oil yiled of patchouli. The present investigation was planned and conducted during three consecutive cycle from 2015-2016 to 2018-2019 under All India Coordinated Research Project on Medicinal and Aromatic plants (AICRP on MAPs), Raipur centre. The field experiment was conducted during kharif seasons of 2015-2016, 2017-18 to 2018-2019 at the university farm of Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh). The experiment treatments were divided into ten treatment in randomized block design with three replications. The treatments comprised of control (T1-RDF: 150:50:50 kgNPK ha^{-1}), 100:50:50 kg ha^{-1} NPK + 2.5 t ha^{-1} vermicompost (T2), T_1 + 20 ppm NAA, T_1 + 30 ppm NAA, T_1 + 20 ppm GA, T_1 + 30 ppm GA, T2+20 ppm

NAA, T2+30 ppm NAA, T2+20 ppm GA and T2+30 ppm GA. The total three cutting were taken in a year and first cutting was taken 4 month after planting. The soil of the experimental site is characterized by clayey loam in texture (*Alfisols*), locally known as "*Dorsa*" soil. Mostly *Alfisols* are bunded and leveled and occur generally, on mid land situation of landscape in Chhattisgarh plains. It is deep and has good water holding capacity. The soil was neutral in reaction. It had low nitrogen, medium phosphorus and high potassium contents. The various parameters of patchouli crop were tested at different time interval like plant height, herbage, oil yield and net return etc.

Result and Discussion

The application of various nutrient levels and PGR was influenced on plant height, herbage yield and oil yield of patchouli crop (Table1 & 2). Maximum mean plant height (93.27cm), herbage yield (16.18 q/ha) and oil yield (36.96 kg/ha) were found with application of 100:50:50 kg ha^{-1} NPK + 2.5 ton ha-1 vermi compost + 20 ppm GA which was superior over application of 100:50:50 kg ha^{-1} NPK + 2.5 ton ha^{-1} vermi compost + 30 ppm GA, 100:50:50 kg ha^{-1} NPK + 2.5 ton ha^{-1} vermi compost+30 ppm NAA, 100:50:50 kg ha^{-1} NPK + 2.5 ton ha^{-1} vermi compost + 20 ppm NAA. The application of 100:50:50 kg ha^{-1} NPK + 2.5ton ha^{-1} vermicompost +20 ppm GA gave highest mean net return (Rs. 43,086 ha^{-1}) followed by 150:50:50 kg ha^{-1}+ 30 ppm GA (Rs 42,106/ha). Venugopal et al. (2008) reported that patchouli plantation under coconut showed higher oil content in dry herbage obtained from partial shade in comparison to open condition. The enhanced oil yields from shade cultivation can be attributed to higher cumulative dry herbage yield per year and presence of high oil percentage in patchouli herbage and low volatilization. Puttanna et al.(2005) observed that patchouli cultivation with NPK application under shade showed maximum oil content in comparison to open condition due to N applications are crucial for high herb and oil production and oil content on air dry herb.Singh et al. (2002) reported that maximum oil yield and content of patchouli was found with application of -1 recommended NPK with vermicompost 10 t ha which indicated that 50% inorganic fertilizer requirement can be supplemented through vermicompost. Sudhakar et al. (2010) also concluded that maximum productivity and biochemical yield in Coleus (Coleus forskohlii) with application of organic manure *viz*. FYM, vermicompost, Neem Cake due to organic manure enhanced the soil fertility status and helped in the plant metabolic activity through supply of micronutrients such as zinc, iron, copper, manganese, etc. Chauhan (2000) reported highest net returns in poplar + lemon gross combination however similar findings was also reported by Sharanabasappa *et al*. (2007) in case of Teak + Aloe and Teak and Coleus combinations.

Table 1: Effect of nutrient management and PGR on growth and herbage yield of patchouli

Treatment	Plant height (cm)				Herbage yield (q/ha)			
	2015-16	2016-17	2017-18	Mean	2015-16	2016-17	2017-18	Mean
T_1: Control (RDF: 150:50:50 kg NPK ha^{-1})	47.56	69.37	71.45	62.79	11.41	10.71	10.20	10.77
T_2: 100:50:50 kg ha^{-1} NPK + 2.5 t ha^{-1} vermicompost	54.50	81.10	83.85	73.15	13.32	12.46	11.92	12.57
T_3: T_1 + 20 ppm NAA	55.43	84.80	85.66	75.30	14.05	13.60	12.47	13.37
T4: T_1 + 30 ppm NAA	57.36	85.73	89.66	77.58	14.67	13.97	13.11	13.92
T5: T_1 + 20 ppm GA	59.16	87.73	91.15	79.35	14.05	14.13	13.75	13.98
T6: T_1 + 30 ppm GA	60.83	87.03	92.46	80.11	15.32	14.17	14.08	14.52
T7: T_2 + 20 ppm NAA	60.83	88.27	93.93	81.01	14.44	14.63	14.19	14.42
T8: T_2+ 30 ppm NAA	62.33	91.40	95.72	83.15	14.51	15.20	14.66	14.79
T9: T_2+20 ppm GA	70.5	102.93	106.39	93.27	16.30	15.63	16.60	16.18
T10:T_2+ 30 ppm GA	64.733	100.83	103.22	89.59	15.57	15.50	15.03	15.37
SEm±	2.02	3.26	2.53	-	0.61	0.55	0.38	-
CD (5%)	6.01	9.69	7.53	-	1.82	1.64	1.13	-

Table 2: Effect of nutrient management and PGR on oil yield and net return of patchouli

Treatment	Oil yield (kg/ ha)				Net return (Rs./ha)			
	2015-16	2016-17	2017-18	Mean	2015-16	2016-17	2017-18	Mean
T_1: Control (RDF: 150:50:50 kg NPK ha^{-1})	25.43	22.60	21.11	23.05	15647	17856	13382	15628
T_2: 100:50:50 kg ha^{-1} NPK + 2.5 t ha^{-1} vermi-compost	31.36	26.66	25.16	27.73	18601	18151	13659	16803
T_3: T_1 + 20 ppm NAA	32.18	29.51	26.44	29.38	32496	38578	29352	33475
T4: T_1 + 30 ppm NAA	33.97	30.04	28.15	30.72	36962	40160	34502	37208
T5: T_1 + 20 ppm GA	32.66	31.23	29.56	31.15	33709	43741	38697	38715
T6: T_1 + 30 ppm GA	35.63	31.17	30.55	32.45	41121	43524	41674	42106
T7: T_2 + 20 ppm NAA	34.62	32.34	30.69	32.55	26719	35178	30239	30712
T8: T_2+ 30 ppm NAA	35.44	34.05	31.77	33.75	28761	40293	33449	34167
T9: T_2+20 ppm GA	39.68	35.18	36.02	36.96	39366	43679	46214	43086
T10:T_2+ 30 ppm GA	37.65	34.41	33.06	35.04	34290	41371	37321	37660
SEm±	1.41	1.19	0.82	-	-	-	-	-
CD (5%)	4.19	3.55	2.42	-	-	-	-	-

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References

1. Chauhan HS. Performance of poplar (*Populus deltoides*) based agroforestry system using aromatic crops. Indian J Agroforestry. 2000a; 2:17-21.
2. GoI. Report of the Taskforce on medicinal plants in

India. Planning commission, Goverment of India, Yojna Bhawan, New Delhi, India, 2000.
3. Puttanna K, Prakashrao EVS, Ganesh Rao RS, Gopinath CT, Ramesh S. Effect of shade and nitrogen on the herb yield and longevity of patchouli (*Pogostemon cablin*). J Medicinal and Aromatic Plant Sciences. 2005; 27:297-300.
4. Rajeshwar Rao BR, Singh K, Kaul PK, Bhattacharya AK. Productivity and profitability of sequential cropping of agricultural crops with aromatic crops and continuous cropping of aromatic crops. J Medicinal and Aromatic Plant Sciences. 2000; 22:214-217.
5. Sharanbasappa A, Pujar SL, Madiwalar KS, Channabasappa, Kumar P. Performance of medicinal and aromatic plants as intercrops with teak. Karnataka J Agricultural Sciences. 2007; 20(1):178-179.
6. Singh M, Sharma S, Ramesh S. Herbage, oil yield and oil quality of patchouli [*Pogostemon cablin* (Blanco) Benth.] influenced by irrigation, organic mulch and nitrogen application in semi-arid tropical climate. Ind. Crops Prod. 2002; 16:101-107.
7. Sudhakar HA, Mangesh S, Shivayogappa G, Prabhuling G, Babu P. Standardization of organic practices for coleus (*Coleus forskohlii*), Biomed, 2010, 98-103.
8. Venugopal CK, Mokashi AN, Jholgiker P. Influence of different propagation environment and IBA treatments on rooting efficiency of patchouli (*Pogostemon cablin* Benth.) cuttings. J Medicinal and Aromatic Plant Sciences. 2008; 30:146-148.