Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2021; 10(2): 1515-1516
Received: 02-01-2021
Accepted: 11-02-2021

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Evaluation of FYM and inorganic nitrogen on root rat disease and herbage yield of Kalmegh (*Andrographis paniculata*)

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Abstract
Field experiment conducted during 2019 and 2020 at medicinal and aromatic farm at A.N.D. University of Agriculture and Technology, Kumarganj, Ayodhya, UP, to study the evaluation of FYM and inorganic nitrogen on root rat disease and herbage yield of Kalmegh (*Andrographis paniculata*). The results of present study revealed that minimum root rot disease severity was found in FYM 16 ton ha^{-1} and maximum dry herbage yield was 45.05 q ha^{-1} in FYM 14 ton +10 kg N ha^{-1} in comparison to control 37.05% and 14.88 q ha^{-1} root rot disease severity and dry herbage yield respectively.

Keywords: FYM, inorganic nitrogen, *Andrographis paniculata*

Introduction
India, which is known as "Herbarium of World" due to the availability of a large number of indigenous medicinal plants bestowed with diverse climatic conditions that are suitable for cultivation of medicinal plants. About 2000 indigenous plant species have curative properties and 1300 species are known for their aroma and flavours. The Indian system of medicine has identified 1500 medicinal plants, of which 500 species are commonly used as in the preparation of several medicines (Singh, 2005) [6]. Among these, Kalmegh is one of them which is replacing the endangered medicinal plant species i.e. Chiraita (*Swerta chirata*). Kalmegh is a bitter annual (perennial, if maintained) herb, erect, 50 cm to 1.0 m. in height, stem quadrangular, heavily branched and having leaves opposite, short petioles, flowers in racemes. It is widely distributed throughout the plains of India from Uttar Pradesh to Assam, Madhya Pradesh, Tamil Nadu and Kerala. The *Panchang* means whole plant is being used for the preparation of various medicines; medicinally it is bitter, acrid, cooling, laxative antipyretic, anti-inflammatory, expectorant, anthelmintic, digestive and stomachic. It is useful in hyperpiesia, burning sensation, wounds, ulcers, chronic fever, malarial and intermittent fevers, inflammations, cough, bronchitis, skin diseases, lever disorders, diarrhoea, dysentery and hemorrhoids. In spite of several uses of Kalmegh area and production are not increasing due to many constraints. Among of them soil borne diseases are major limiting factors. Root rot is one of the most destructive diseases found all the Kalmegh growing area. The pathogen being soil-borne and soil inhabitant, persists for longer periods in the soil. Hence, organic production and protection technology offers a better possibility in horticulture rather than in field's crops (Pathak and Ram, 2004) [3].

Methods and Material
The experiment for the standardization of optimum doses of organic manure (FYM) along with inorganic nitrogen in Kalmegh was laid out in 2019 and 2020 in RBD with seven doses of FYM *Viz;* T_1: Control, T_2: 16 tones FYM ha^{-1}, T_3: 14 tones FYM + 10 kg N ha^{-1}, T_4: 12 tones FYM + 20 kg N ha^{-1}, T_5: 10 tones FYM + 30 kg N ha^{-1}, T_6: 8 tones FYM + 40 kg N ha^{-1}, T_7: 6 tones FYM + 50 kg N ha^{-1} and replicated thrice. Inorganic nitrogen has been given 50% as basal and rest in two equal split at 20-30 & 50-60 days after transplanting. Raised nursery beds of 1m width were prepared. The sowing of seed in nursery bed was done on june 2019 and 2020, care has been taken that the seeds were not buried deep in the soil. The transplanting was done on 13.08.2019 and 16.08.2020. Data was statistically analyzed by Gomez & Gomez (1984). The observations were recorded *Viz*; Plant height, Number of branches, Fresh and dry weight of leaves $plant^{-1}$ at harvest, Fresh and dry weight of stem $plant^{-1}$ at harvest. Fresh and dry herbage yield $plant^{-1}$. Percent root rot severity and Location Severity Index (LSI) were calculated with the help of following formula-

$$\text{Percent root rot severity} = \frac{\text{Numbers of root rot infected plants}}{\text{Total number of plant transplanted}} \times 100$$

$$\text{Location severity index} = \frac{\text{Total percent of root rot incidence in all treatment}}{\text{Number of treatment}}$$

Results and discussion

All the combination of FYM + inorganic nitrogen effectively minimized root rot severity and increased herbage yield **(**Table – 1). The minimum root rot severity was recorded in FYM 16 ton ha^{-1} (13.04%) followed by FYM 14 ton + 10kg N ha^{-1}(17.63%), FYM 12 ton + 20kg N ha^{-1}(18.56%) and FYM 10 ton +30 kg N ha^{-1}. The maximum root rot severity was found in control (37.12%). Local severity index was calculated and found 22.39%. Non-significant differences were recorded in plant height plants^{-1}of Kalmegh, it ranged from 55.53 to 63.00 cm. Maximum height was recorded in T_3 (14 tones FYM+10 kg N ha^{-1}) followed by T_5 (10 tones FYM+30 kg N ha^{-1}) and T_6 (8 tones FYM+40 kg N ha^{-1}). Minimum plant height was recorded in controlled plants. Number of branches in Kalmegh varied significantly due to various doses of FYM and inorganic nitrogen. Number of branches varied from 18.16 to 26.76. Plants treated with 6 tones FYM + 50kg N ha^{-1} (T_7) showed maximum branching (26.76 plant^{-1}) followed by 14 tones FYM + 10 kg N ha^{-1} (23.16) and 8 tones FYM + 40 kg N ha^{-1}. Minimum branching was observed in controlled plants. Fresh and dry leaf weight of Kalmegh plants varied significantly due to various doses of FYM and inorganic nitrogen. Fresh leaf weight varied from 99.06 to 273.50 q ha^{-1} while dry leaf weight ranged from 49.53 to 136.75 q ha^{-1}. Plants supplied with 14 tones FYM along with 10 kg N ha^{-1} showed maximum leaf weight followed by 10 tones FYM + 30 kg N ha^{-1} and 12 tones FYM + 20 kg N ha^{-1}. Minimum leafs were harvested in untreated plants (Control). Fresh and dry stem weight of Kalmegh plants varied significantly due to various doses of FYM and in-organic nitrogen. Fresh stem weight varied from 164.90 to 526.46 q ha^{-1} while dry stem weight ranged from 87.70 to 321.68 q ha^{-1}. Plants supplied with 14 tones FYM along with 10 kg N ha^{-1} showed maximum stem weight (fresh as well as dry) followed by 10 tones FYM + 30 kg N ha^{-1} and 16 tones FYM ha^{-1}. Minimum stem was harvested in untreated plants. Fresh and dry herbage yield of Kalmegh plants varied significantly due to various doses of FYM and inorganic nitrogen. Fresh herbage yield varied from 27.25 to 82.63 q ha^{-1} while dry herbage yield ranged from 14.88 to 45.05 q ha^{-1}. Plants supplied with 14 tones FYM along with 10 kg N ha^{-1} showed maximum herbage yield (fresh as well as dry) followed by 6 tones FYM + 50 kg N ha^{-1} and 16 tones FYM ha^{-1}. Minimum herbage yield was harvested in untreated plants (Control).

FYM have plant growth promoting bacteria which are inhibiting competitive pathogens and stimulating the growth and defense mechanisms of plants (Garrett, 1977) [1]. Rehman *et al.* (2008) found that the FYM at 45 ton ha^{-1}produce maximum spikes M^2 in wheat. Combined use of organic manures and alone application of FYM improve the soil physical, chemical and biological properties and induced the proper utilization of fertilizers for improving seed and straw yield of crop (Patil *et al*., 2012) [4]. Similar finding were reported earlier by Ismail *et al* (2017) by using vermicompost in chickpea. Thalkar and Patil (2019) [4] were found increased grain yield and straw yield of wheat, where combinations of organic and inorganic fertilizers were used. The increase in vegetative growth may be due to better flow of various macro and micro elements along with plant growth substances into the plant system.

Table 2: Evaluation of FYM and inorganic nitrogen on root rot severity and herbage yield of Kalmegh

S. No	Treatments	Root rat severity (%)	Plant height (cm)	No. of branches per plant	Fresh leaf weight/ plant (g)	Dry leaf weight/ plant (g)	Fresh stem weight per plant (g)	Dry stem weight per plant (g)	Fresh herbage yield q/ha	Dry herbage yield q/ha
1.	Control	37.12	55.53	18.46	99.06	49.53	164.90	87.70	27.25	14.88
2.	FYM 16 ton/ha	13.04	58.20	19.23	143.53	95.66	478.86	280.77	67.35	36.73
3.	FYM 14ton/ha + 10 kg N/ha	17.63	63.00	23.16	273.50	136.75	526.46	321.68	82.63	45.05
4.	FYM 12 ton/ha + 20 kgN/ha	18.56	57.90	19.23	190.86	114.52	312.70	162.15	53.81	29.36
5.	FYM 10 ton/ha + 30 kgN/ha	20.54	59.60	18.16	201.06	120.64	482.53	287.12	58.50	31.94
6.	FYM 8 ton/ha + 40 kgN/ha	23.72	58.20	20.06	129.86	81.16	214.90	128.94	48.60	26.53
7.	FYM 6 ton/ha + 50 kgN/ha	26.16	57.16	26.76	182.00	91.00	302.66	151.33	75.86	41.38
SEm ±		5.71	2.59	0.98	5.29	3.00	73.33	39.38	5.30	2.89
CD (P=0.05)		17.12	NS	2.15	11.53	6.54	159.79	85.81	11.55	6.30
CV		-	15.13	5.77	30.87	17.50	427.69	229.69	30.92	16.87
Local Severity index(LSI)		22.39%								

Reference

1. Garrett SD. Pthogenic root infecting fungi. Cambridge University Press, London 1977, 293.
2. Gomer KA, Gomer AA. Statiatical Procedures for Agricultural; Research, 2nd edition, Jhon Wiley and Sons, Inc, New York, 1984.
3. Pathak RK, Ram RA. Organic farming system prevalent in India. In: Organic Farming in Horticulture. Eds. R. K. Pathak, R. Kishun, RM, Khan RA Ram, 2004, 13-16.
4. Patil SV, Halikatti SI, Hiremath SM, Babalad MN, Sreenivasa NS, Hebsar NS *et al*. Effect of organics on growth and yield of chickpea in vertisoils. Karnataka journal of Agricultureal Science 2012;25(3):326-331.
5. Rahman Sanzidur, Kamrul Hasan M. Impact of environmental production conditions on productivity and efficacy: A case study of wheat farmers in Bangladesh. Journal of Environmental Management, 2008;88(4):1495-1504.
6. Singh Shipra. Medicinal plants: A natural gift to mankind. Agriculture Today. 2005, 58-60.
7. Smail MM, Ahmed AM, Mousa AE. Effect of organic and inorganic fertilizers on growth and yield of chickpea grown on sandy soil. Journal of Botany.2017;46(1):155-161,
8. Thalkar MG, Pati PK. Effect of organic and inorganic fertilizers on yield of wheat crop of *Triticum aestivum* L. Plant Archives 2019;19(1):122-124.