Performance of garden rue (*Ruta graveolens* L.) to different levels of irrigation and mulches on growth, yield and quality in northern dry zone of Karnataka

Reshma Hajaratsab Mirjanaik, YC Vishwanath, VP Singh, Basavarajappa MP, Sanjeevreddi G Reddi and SM Prasanna

Department of Plantation, Spice, Medicinal and Aromatic Crops, College of Horticulture,UHS, Bagalkot,Karnataka,India

Abstract

Garden rue (*Ruta graveolens* L.) strong smelling rue, commonly known as 'Nagadali' belongs to family Rutaceae. A field experiment was conducted at College of Horticulture, Bagalkot during *kharif* 2019-2020 to study on different levels of irrigation and mulches on growth, yield and quality in garden rue. Among treatments, the treatment combination of I2M3: Irrigation 80% CPE + polythene mulch is best as it gave maximum growth parameters such as plant height (43.13 cm), number of branches per plant (22.80), plant spread (40.17 cm), soil moisture (17.50%) and yield attributes like fresh herbage yield (18.47 t/ha) and dry herbage yield (4.89 t/ha). The rutin content (1.12 %) was recorded significantly maximum in I4M3: Irrigation 40 % CPE + polythene mulch.

Introduction

Garden rue (*Ruta graveolens* L.), strong smelling, glabrous, small evergreen sub- shrub commonly known as 'Nagadali' or 'herb-of grace' belongs to family Rutaceae. It is semi- woody perennial plant grows up to a height 0.6 to 0.9 m tall. It is an odoriferous herb entire plant is of medicinal importance. It is used in Ayurveda, Homoeopathy and Unani. In traditional system of medicine, garden rue used as stimulant, emmenagogue, diuretic, abortefacient, resolvent antiaphordisiac and increases menstrual activity (Parray *et al*., 2012).

Water is one of the most important essential criteria for production of crops. Irrigation scheduling is one of most critical tool and important managerial activity which effects efficient utilization of water by crops. Use of different types of soil covers or mulches like straw, leaves, husk, crop residues and black plastics have been found to beneficial to conserve soil moisture, improves fertilizers efficiency, increasing infiltration rate, moderate soil temperature and increase in yield of different medicinal plants.

Garden rue is hardy and performs well even under less irrigated condition. Looking in to this, to know the quantity of irrigation required with different mulches is used to assess the performance of crop. Hence in this study, the response of garden rue to the combined effect of different levels of irrigation in conjunction with mulches is evaluated.

Materials and methods

Garden rue seeds were collected from department of PMA, COH Bagalkot to raise seedlings. Seed rate is 300g /ha. Seedlings of rue were ready for field transplanting after 90 days of sowing with spacing of 60 x 45 cm. Experiment laid out in split plot design with four levels of irrigation (I1:100%, I2:80%, I3:60% and I4:40% Cumulative pan evaporation) as main plot and three different types of mulches (M1: Without mulch, M2: sugarcane trash and M3: polythene mulch) as sub plot with three replications.

Treatment details

I1M1 (Irrigation 100% CPE + without mulch),
I1M2 (Irrigation 100% CPE + sugarcane trash),
I1M3 (Irrigation 100% CPE + polythene mulch),
I2M1 (Irrigation 80% CPE + without mulch),
I2M2 (Irrigation 80% CPE + sugarcane trash),
I2M3 (Irrigation 80% CPE + polythene mulch),
I3M1 (Irrigation 60% CPE + without mulch),
I3M2 (Irrigation 60% CPE + sugarcane trash),
I3M3 (Irrigation 60% CPE + polythene mulch),
I4M1 (Irrigation 40% CPE + without mulch),
I4M2 (Irrigation 40% CPE + sugarcane trash),
I4M3 (Irrigation 40% CPE + polythene mulch)
were laid out in experimental plot

The observation on the following growth yield and quality parameter was recorded at final harvest by randomly labeling five plants per plot in each treatment. The data recorded were subjected to statistical analysis with software used WASP.2 (Web Agricultural Statistics Software Package). The results were comparing at 5% of probability using Fisher's test (Sundararaj *et al*., 1972).

Discussion

The maximum growth, yield and quality parameters were recorded in treatment combination of Irrigation 80% CPE + polythene mulch at harvest. This might be due to higher availability of soil moisture by providing irrigation and indirectly impact on the uptake of nutrients from soil which maintains the turgidity cells of plants. Addition of mulches with moist soils leads to favorable condition for crop growth which ultimately resulted in triggering the production of plant hormones namely Indole Acetic Acid (IAA) which enhanced rapid vegetative growth and development of crop using the initial reserve food material, deposited of more food material finally gave more dry herbage yield. These records are in close correspondence with the works of Kumar *et al*. (2014) in stevia.

The soil moisture percentage was recorded maximum in I1M3 and lower soil moisture in I4M1. Differences in soil moisture were due to the mulches with high soil moist enhance water holding capacity of soil and also act as barrier to reduce surface evaporation rate, deep percolation and thereby accelerates maximum water availability in soil with better conservation of soil moisture. These results are also in the line of Sharma *et al*. (2016) in fenugreek.

The rutin content was found maximum in I4M3. Difference in rutin composition is due to biosynthesis activation of secondary components are more in water stress conditions and soil water relationship which enhances production of secondary metabolites in rue plants. These outcomes are in confirmation with results of Konnur *et al*. (2018) in garden rue.

Results

Among treatments, combined effect of Irrigation 80% CPE + polythene mulch resulted maximum plant height (43.13 cm), number of branches per plant (22.80), plant spread (40.17 cm) at harvest. Significantly lowest in I4M1, The soil moisture percentage was recorded maximum in I1M3 (Irrigation 100% CPE + polythene mulch) (19.60) which was on par with I2M3 (17.50%) and lower soil moisture (6.67%) in I4M1 at harvest. The Irrigation 80% CPE + polythene mulch resulted maximum yield attributes like fresh herbage yield (18.47 t/ha) and dry herbage yield (4.89t/ha) at final harvest. Significantly minimum fresh herbage yield (6.70 t/ha) in I4M2 and dry herbage yield was recorded in I1M1 (1.88 t/ha). The rutin content (1.12 %) was found maximum in I4M3: Irrigation 40 % CPE + polythene mulch.

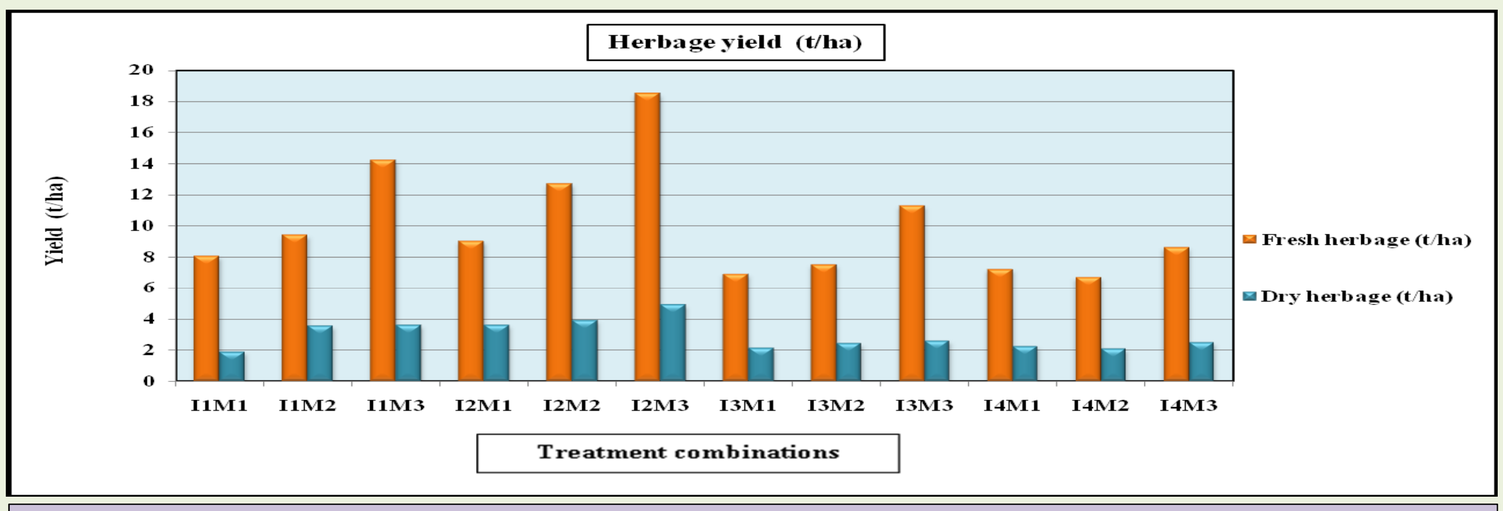

Fig 1.Influence of different levels of irrigation and mulches on yield parameter (t/ha) in garden rue

Conclusion

Among the treatment combinations of I2M3: Irrigation 80% CPE + polythene mulch showed maximum growth *viz.,* plant height (43.13 cm), number of branches per plant (22.80), plant spread (40.17 cm), soil moisture (17.50%) and yield attributes like fresh herbage yield (18.47 t/ha), dry herbage yield (4.89 t/ha) at final harvest. Hence I2M3:Irrigation 80% CPE + polythene mulch is a best treatment combination that recorded maximum crop growth and productivity of garden rue under Northern dry zone of Karnataka.

References

1. Konnur, S., Umesh, K., Prasad, B. N., Shivashankar, K. S., and Patil, S. V., 2018, Integrated nutrient management in garden rue. *Int. J. Phy. Pharconc*., 3:443-446.
2. Kumar R, Sood S, Sharma S, Kasana RC, Pathania VL, Singh B andSingh RD.,2014 Effect of plant spacing and organic mulch on growth, yield and quality of natural sweetener plant stevia and soil fertility in western Himalayas. *Int. J Plant Prod* ,**8**(3):1735-6814
3. Parray, S. A., Bhat, J. U., Ahmad, G., Jahan, N., Sofi, G., and Iqbal, S. M. F., 2012, *Ruta graveolens*: from traditional system of medicine to modern pharmacology: an overview. *Am. J. Pharm. Tech Res*., **2**(2): 2249-3387
4. Sharma S,Patel RH and Sharma OP,2016Effect of irrigation scheduling and organic manures on moisture extraction pattern, consumptive use, water use efficiency and yield of fenugreek. *Int. J Seed Spices,* **6**(2):13-18
5. Sundraraj N, Nagaraju SC, Venkataramu MN, Jaganath MK., 1972, Design and analysis of field experiments, University of Agricultural Sciences press publication.