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EFFECT OF ORGANIC FERTILIZERS ON SHOOT MORPHOLOGY OF *ANACYCLUS PYRETHRUM* IN THREE DIFFERENT ALTITUDES

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ABSTRACT

Anacyclus pyrethrum is an exotic plant belong to Asteraceae. Its shoot length variation is observed in three organic fertilizers at three different altitude up to active growth periods. The shoot length of site-1(HG) was recorded maximum in VC (23.10 cm) followed by FYM (22.17cm), while in site-2(NN) and site-3(KK) maximum shoot length was also recorded in FYM16.14 cm and 12.18 cm respectively.

Keywords : Anacyclus pyrethrum, Morphological variations, Organic fertilizers.

INTRODUCTION

Variation in plant morphology appears through out the ontogeny: however, variation in some species may peak at the middle of growth period. In addition, available soil nutrient level also plays important role in determining morphological variation in plants (Pilglucci et al 1997). Population studies in many plants have revealed the existence of localized populations adapted to a particular environment (Lynn et al 2001). Studies on Aconitum atrox has revealed that the morphological and biochemical variation in different populations may be associated with varying environmental and edaphic conditions. However, this is a polymorphic species with considerable phenotypic plasticity, so it can be used as an indicator to the impact of microclimate on plant life (Kuniyal et al 2002).

Ingeneral, a gradual decrease in the root shoot length with in creasing altitude has been reported in plants of similar species while grown along an altitudinal gradient. Rajsekaran et al (1998) have reported considerable morphological

variations in the sub alpine populations of Podophyllum hexandrum growing in Garhwal Himalaya. Variation in the morphological parameters such as plant height is also related to the soil and varying seasonally and on altitudinal alterations (Krishanan, et al 2000).

Morphology and physiological differences between populations are frequently associated with the environmental differences. Some of the perennial herbs develop highly elongated and fibrous roots stocks, which remains buried in soil, unaffected by low temperature and snow during winter species growing on exposed slopes and rocks faces assume a cushion of rosette habit, while some develops thick woolly hairs around them (Aswal, et al 1989).

Anacyclus pyrethrum DC is perennial procumbent herb belonging to family Asteraceae. It is native of Arabia and distributed in North-Africa and grown as ornamental herb in Europe and other temperate countries. In India, it is cultivated as medicinal crop on limited scale in Bangalore and Nilgiri Hills in Tamil Nadu (Sarin 2008). It has been given in paralysis, hemiplegia, epilepsy, chorea and rheumatism and a host of other diseases. As the root is a sialogogue, it is administered to backward children in the Deccan to make them talk (Nadkarni,1978).The Anacyclus pyrethrum is an exotic plant and its cultivation is very limited scale in India. So, keeping this in view present study is undertaken. The main objective of this study is to find out the positive effect of organic fertilizers and suitable altitude for shoot growth.

STUDY AREA

The experiment was carried out at the three nurseries of Forest Department located at different altitudes (elevation) in Tehri Garhwal which lies between the parallels of 30.3'and 30.53' north latitude and 77.56' and 79.04' east longitude.

1. Dr. Susheela Tiwari Herbal Garden Rishikesh at 460m above from sea level (Site I).

2. Narendranagar (Dhaulapani) at 960m above mean sea level (Site II).

3. Kaddukhal at 2530m above mean sea level (Site III).

Climate

The highest temperature (37.6 ^{0}C at site I ,32.4 ^{0} C at Site II and 22.1 ^{0} C at Site III) was observed in the month of June whereas lowest temperature (20.8 ^{0}C at site I, 14.81 ^{0} C at Site II and 10.2 ^{0} C at Site III) was recorded for the month of December. The highest rainfall wasobserved in the month of July (359.4mm at site I, 590mm at site II and 712.4mm at site III).

Soil profile

The soils of the three sites selected for the cultivation studies exhibit that the soils of Site-1(HG) in three different depths (0-10 cm, 10-20 cm, 20-30cm) are sandy loam and Site-2 (NN) and Site-3 (KK) are loamy soils.The percentage of organic carbon, NPK is highest in site-1(HG) followed by site-2(NN) and site-3(KK).

MATERIAL AND METHODS

FertilizerApplications

The three doses of Bio-compost (BC), FYM and the VC @ 10 tons per hectare (18 kg per beds experimental bed of 1.25 x 3 m size) were applied. The manures were applied in the three equally divided dose applications were divided as follows: First (one third) dose at the time of initial field planting and the second (one third) dose just before flowering, and the remaining third dose was administered during flowering. No external inputs of organic fertilizers were made in the control plots.

Preparation of experimental beds:

The terraces were selected for the purpose of cultivation of Anacyclus pyrethrum and an area of more than 75 square meters was earmarked for the experimental trials of cultivation for each experimental area. Though the desired net area was 62.20 M ^{2}but additional 25 M ^{2} area was utilized for demarcation strips and working space and to counteract the practical problems of the hill's terrain 36 kg of BC/FYM /VC was used per bed (1.25 x 4.0 M) in three equal doses. The experimental beds were dug for 30cm depth, soil was well turned and the first (1/3rd) doses of the organic manures were mixed well in the beds. The 23cm high raised beds were prepared.

20 Day sold nursery germinated seedlings were transplanted in the experimental (raised bed) plots of 3.0 x1.25 meters at 30 x 30 cm spacing using CRD design. 40 seedlings were transplanted in each bed. The experimental studies of shoot growth at different time intervals. Therefore, 40 plants were raised per beds. Irrigation so on after the transplanting was provided and periodical

watering and weeding were undertaken until the second year (Completion of the experimental period). For each experimental site, three replicates of all the fertilizer treatments were laid apart from equal replicates of their controls resulting in 12 plots. The field layout design is as follows:

1.25 M

3.0 M

B. C	V. C	F. Y. M.
FYM	C	B. C
V. C	B. C	C
C	FYM	V. C

RESULTS

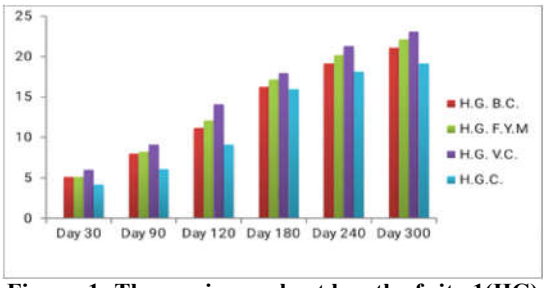
Shoot Length

The data reveals that all the treatments resulted in steady increase in the shoot length.

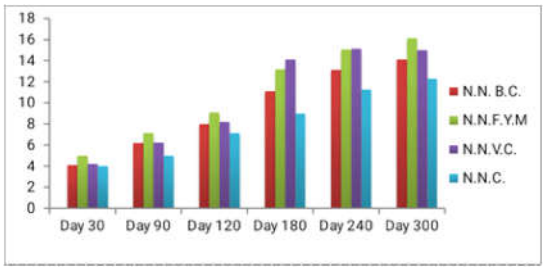
The recorded data is presented in table 1.

Table 1: Shoot Length of Plants (cm) in Different Time Intervals of Growth

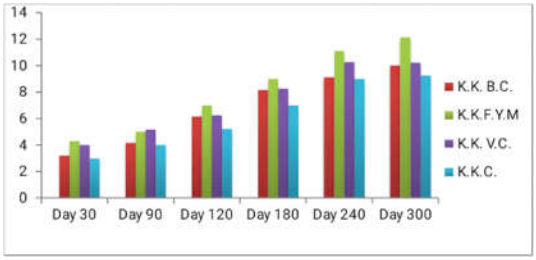
Experimental sites/ manure treatments	Day 30	Day 90	Day 120	Day 180	Day 240	Day 300
H.G. B.C.	5.12	8.00	11.16	16.26	19.14	21.03
H.G. F.Y.M	5.16	8.22	12.10	17.15	20.16	22.17
H.G. V.C.	6.00	9.12	14.10	18.00	21.29	23.10
H.G.C.	4.19	6.12	9.12	16.00	18.14	19.14
N.N. B.C.	4.10	6.19	8.00	11.13	13.14	14.12
N.N.F.Y.M	5.00	7.15	9.10	13.19	15.12	16.14
N.N.V.C.	4.26	6.22	8.19	14.12	15.14	15.00
N.N.C.	4.00	5.00	7.14	9.00	11.26	12.28
K.K. B.C.	3.22	4.16	6.16	8.19	9.13	10.00
K.K.F.Y.M	4.29	5.00	7.00	9.00	11.13	12.18
K.K. V.C.	4.00	5.19	6.25	8.26	10.27	10.22
K.K.C.	3.00	4.00	5.21	7.00	9.00	9.25



Figure, 1: The maximum shoot length of site-1(HG) was found to be 23.10 cm under the influence of Vermi- compost.



Figure, 2: The maximum shoot length site-2 (NN) recorded to be 16.14 cm in the FYM.



Figure, 3:The maximum shoot length of the site-3(KK) under the influence of FYM was found to be12.18cmundertheinfluenceofFYM.

DISCUSSION

Morphological observation was carried out for shoot length, in two-month intervals during the period of crop growth. The shoot length of site-1(HG) was recorded maximum in VC (23.10 cm) followed by FYM (22.17cm). It is due to, in site-1(HG) percentage of organic carbon, Nitrogen, Phosphorus and Potassium was maximum recorded in site-1(HG), which helps to growth of shoot length. Similarly, maximum shoot length was recorded in FYM followed by Vermi-compost in black gram (Vigna mungo) reported by (Kumpawat, 2010). Variation in the growth parameters in plants are supposed to be sensitive to the varying environmental condition (Lynn et al 2001).

While in site-2(NN)shoot length shorter then site -1(HG), this view also supported by researchers that many plants are known to be shorter at higher latitudes (Chapin et al, 1981, Billings, 1987; Farmer, 1993; Farmer, O'Reilly, and Shaotang, 1993), due to lower temperatures, increased wind speed and low phosphate availability (Woodward, 1983; Fitter and Hay, 1987).

In stressful environments of low productivity, plants are usually slow growing and thus likely to show a physiologically rather than morphologically plastic response to heterogeneous environment (Grime, 1979; Hutchings and de Kroon, 1994; Jonsdottir and Watson,1997). Although site-3(KK) environments can be characterized as stressful, i.e., with low temperatures, short growing seasons, and low nutrient availability, site-3(KK) express considerable morphological plasticity (Havstrom et al., 1995; Molau, 1997; Stenstrom and Jonsdottir, 1997; Welker et al., 1997; Stenstrom, 2000).

In site-2(NN) and site-3(KK) maximum shoot length was also recorded in FYM @ 10 tons/ hec 16.14 cm and 12.18 cm respectively because FYM manure influence soil productivity through their effect on soil physical, chemical and biological properties (Babhulkar et al 2000). The spreading of FYM on grassland is an efficient way of using and recycling nutrients and to minimize leakage of minerals to surface and ground water (Thompson et al 1989; Linden et al 1993).

CONCLUSION

The shoot length is maximum intropical region (Site-1) incorporated with Vermicompost followed FYM while minimum in sub-temperate region (Site-3) in Bicompost and control condition.

REFERENCES

Aswal, B.S., Goel, A.K., 1989, Alpine flora in west Himalayan mountains of India. A curious view, Himalayan Research and Development, 8(I &II):1-10.

Babhulkar, P.S., Wandile, R.M., Badole, W.P., Balpande, S.S.,2000, Residual effect of long –term application of FYM and fertilizers on soil properties (vertisols) and yield of Soyabean. Journals of Indian Society of Soil Science48: 89-92.

Billings W. D. 1987. Constraints to plant growth, reproduction, and establishment in arcticenvironments. Arctic and Alpine Research19:357-365.

Chapin F. S., III. 1981. Field measurements of growth and phosphate absorption in Carex aquatilis along a latitudinal gradient. Arctic and Alpine Research13: 83-94.

Chapin F. S., III M. C. Chapin 1981. Ecotypic differentiation of growth processes in Carex aquatilisal on glatitudinal and local gradients. Ecology 62:1000-1009.

Farmer R. E., Jr. 1993. Latitudinal variation in height and phenology of balsam poplar. SilvaeGenetica42: 148-153.

Farmer R. E., Jr. G. O'Reilly D. Shaotang 1993. Genetic variation in juvenile growth of tamarack (Larix laricina) in northwestern Ontario. Canadian Journal of Forest Research 23: 1852-1862.

Fitter A. H. R. K. M. Hay 1987. Environmental physiology of plants, 2nd ed. Academic Press, London, UK.

Grime J. P. 1979. Plant strategies and vegetation processes. John Wiley & Sons, Chichester, UK.

Havstrom M. T. V. Callaghan S. Jonasson J. Svoboda 1995. Little ice age temperature estimated by growth and flowering differences between subfossil and extant shoots of Cassiopetetragona, an arctic heather. Functional Ecology 9: 650-654.

Hutchings M. J. H. de Kroon 1994. Foraging in plants: the role of morphological plasticity in resource acquisition. Advances in Ecological Research 25: 159-238.

Johnson D.E .1998m .Applied multivariate methods for data analysts. Duxbury Press, Pacific Grove, California,USA.

Krishanan, N., Jeyachandran, Nagendran, N., 2000, Effect of seasonal and altitudinal variation on growth performance of Acalypha indica L. in Algarhills (Eastern Ghats), South India. Tropical Ecol. 41(1):41-45.

Kuniyal, C.P.; Bhadula, S.K.; Prasad P.; 2002, Morphological and Biochemical Variations among the natural populations of Aconitum atrox (Bruhl) Muk (Ranunculaceae). J. Plant Biol. 29 (1):1-5.

Kumpawat, B.S.; 2010, Integrated nutrient management in black gram (Vigna mungo) and its residual effect on succeeding mustard (Brassica juncea) crop. Indian Journal of Agriculture Science80(1):76-79.

Linden, B.; Wallgren, B.;1993, Nitrogen mineralization after leys ploughed in early or late autumn. Swedish Journal of Agriculture Res23: 77-89.

Lynn, D.E, Waldren, A. 2001, Morphological variation in population of Ranunculus repens from temporary lime stone lake (Turlough) in the west of Ireland. Ann Bot 87:9-17.

Molau U. 1997. Responses to natural climatic variation and experimental warming in two tundra plant species with contrasting growth forms: Cassiopetetragona and Ranunculus nivalis. Global Change Biology 3: 97-107.

Nadkarni A.K.,1976, Indian Materia Medica. Vol 1 :97-98.

Pilglucci, M.; Dhorio, P.; Schiching, C.D.; 1997, Phenotypic plasticity of growth trajectories in two species of lobelia in response to nutrient availability. J. Ecol., 85: 265-276.

Rajsekaran, C.; Kundiyal, C.P.; Prasad, P.; Bhadula, S.K.; 1998, Growth and ammonium assimilation in Selinum veginatum Clarke and Glycine Max L. seedlings grown at different altitude of Garhwal Himalayan. India. Physiology Mol. Bio Plants, 4: 33-37

Sarin,Y.K.;2008, Principal crude herbal drugs of Indi: Anillustrated guide to important largely used and traded medicinal raw material of plant origin. Bishen Singh Mahendra Pal Singh Pub.8-9.

Stenstrom A. 2000. From pollination to variation—reproduction in arctic clonal plants and the effects of simulated climate change. Ph.D. dissertation, Goteborg University, Sweden.

Stenstrom A.I.S. Jónsdottir 1997. Responses of the clonals edge, Carexbigelowii, to two seasons of simulated climate change. Global Change Biology 3 : 89-96.

Thompson, R. B.; Pain, B.F.;1989, Denitrification from cattle slurry applied to grassland. In: Nitrogen in organic wastes Applied to soil. Academic press, London. 247 -260.

Welker J. M. U. Molau A. N. Parsons C. H. Robinson P. A. Wookey 1997. Responses of Dryas octopetala to ITEX environmental manipulations: a synthesis with circumpolar comparisons. Global Change Biology3:61-73.

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