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Conjuctive Use of Neem Coated Urea, Enriched Pressmud Compost and Sea Weed Extract on Number of Leaves Plant^{-1}, Leaf Area Index, Chlorophyll Content and Pod Yield Plant^{-1} in Ambrette

S.Srinivasan, A.Angayarkanni and N.J.Einthu Pochine
Dept. of Soil Science & Agricultural Chemistry, Faculty of Agriculture, Annamalai University, Annamalainagar- 608 002
E mail ID: sribal20@yahoo.com

ABSTRACT
Nitrogen is one of the most important nutrients for plants and when it is applied through fertilization it increases the total biomass production and yield. Phosphorus has a vital role in the breakdown of carbohydrates and other foods produced by photosynthesis in plant. Equally important is the process of photosynthesis as the role that P plays in the reproductive and inheritance process of plant. Ambrette (Abelmoschus moschatus Medic.) is a medicinal plant native to India and also grown throughout the tropical regions like Africa, Egypt, Madagascar and Columbia. A field experiment was conducted to study the conjoint effect of fertilizers, NCU, EPMC and SWE at Farmer's Field, Sivapuri Village, Chidambaram Taluk, Cuddalore District during Kharif, 2018. The study comprised of eight treatments and three replications belongs to Randomized Block Design. The treatments of this study are as follows: T_1- Absolute control, T_2- 100% RDF, T_3-75% RDF –N (NCU), T_4- 75% RDF –P (EPMC), T_5 -75% RDF –N (NCU)+ P (EPMC), T_6 - T_3+SWE, T_7- T_4+SWE, T_8- T_5+SWE. The results of this study significantly improved the growth parameters and yield of ambrette.
Keywords: Ambrette, NCU, EPMC and SWE

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INTRODUCTION

Ambrette (*Abelmoschus moschatus* Medic.) is native to India and also grown throughout the tropical regions like Africa, Egypt, Madagascar and Columbia. It is grown extensively in the Deccan peninsula and in the foothills of Himalayas. Its roots, leaves and seeds are considered valuable traditional medicines. Nitrogen is one of the most important nutrients for plant and when it is applied through fertilization it in increases the total biomass production and yield. It can also increase the economic cost and environmental risks, when N fertilizer management is inaccurate and climatic conditions are unfavorable. (4). In 2015, the Government of India directed that all the fertilizer urea manufactured to promote 100% production of neem coated urea so that the fertility capacity of land can be protected which will later may lead to the higher production of the crop. Pressmud is the major wastes of the sugar industry. Which creates severe environmental pollution and health hazards if it is not treated properly. Phosphorus has a vital role in the breakdown of the carbohydrates and other foods produced by photosynthesis in plant. Equally important is the process of photosynthesis as the role that P plays in the reproductive and inheritance process of plant. P is an essential ingredient of the nucleoprotein, which is located in the nucleus of cells

helps in growth of higher plants. (1).Sea weed extract is a marine macro algae rich in macro, micro nutrients and plant growth hormones *viz.,* auxins, gibberellins and cytokinins. In this experiment, the effect NCU, EPMC and SWE on growth and yield of ambrette interms of number of leaves plant^{-1}, leaf area, leaf area index, chlorophyll content and pod yield plant^{-1} were studied.

MATERIAL AND METHODS

An experiment was conducted to study the changes in growth and yield in ambrette due to application of different combinations of inorganic fertilizers, NCU, EPMC and SWE at Farmer's Field, Sivapuri Village, Chidambaram Taluk, Cuddalore District during *Kharif*, 2018. The study comprised of eight treatments and three replication belongs to Randomized Block Design. The treatments of this study are as follows: T_1- Absolute control, T_2- 100% RDF, T_3-75% RDF –N (NCU), T_4- 75% RDF –P (EPMC), T_5 -75% RDF –N (NCU)+ P (EPMC), T_6 - T_3+SWE, T_7- T_4+SWE, T_8- T_5+SWE. Ambrette (*Abelmoschus moschatus* Medic.) was grown with proper cultural practices. The recommended dose of N:P_2O_5:K_2O is 120:30:40 kg ha^{-1} were applied in the form of urea, SSP and MOP, respectively. NCU, EPMC @ 1000 kg and sea weed extract @ 5% on 30, 60 and 90 DAS were applied as foliar spray as per the treatments. The number of leaves plant^{-1}, leaf area, leaf area index, chlorophyll content and pod yield plant^{-1} were studied.

RESULTS AND DISCUSSION

Number of leaves per plant^{-1}

The number of leaves plant^{-1} recorded at 30, 60, 90, 120 DAS and at harvest are furnished in table 1. showed significant variations among treatments.

At 30 DAS, number of leaves plant^{-1} varied among the treatments and T8- 75%RDF - N(NCU)+P(EMPC)+SWE showed the highest number of leaves plant^{-1} (20.17) followed by T_6 and T_7 registered the number of leaves plant^{-1} of 19.01 and 18.99 which were received 75%RDF - N(NCU)+SWE and 75%RDF - P(EMPC)+SWE, respectively. The lowest number of leaves plant^{-1} of 9.69 was registered in T_1.

At 60 DAS also it is clear that application of 75%RDF - N(NCU)+P(EMPC)+SWE (T_8) recorded the highest number of leaves plant^{-1} of 43.34. The next best number of leaves plant^{-1} of 38.14 and 37.12 were noticed in T_6 and T_7, respectively were on par with each other. Whereas the control (T_1) recorded the lowest number of leaves plant^{-1}(18.85).

Among the various treatments, application of 75%RDF - N(NCU)+P(EMPC)+SWE (T_8) at 90 DAS recorded significantly highest number of leaves plant^{-1}(63.95). Application of 75%RDF - N(NCU)+SWE registered the number of leaves plant^{-1} of 58.13. The lowest number of leaves plant^{-1} (34.43)was observed under control treatment that received no organic manures and inorganic fertilizers.

At 120 DAS, application of75%RDF - N(NCU)+P(EMPC)+SWE (T_8) registered significantly highest number of leaves plant^{-1}(68.79). Application of 100% RDF registered the number of leaves plant^{-1} of 59.89 and it was on par with (T_5) 75%RDF - N(NCU)+P(EMPC) registered the number of leaves plant^{-1}of 61.52. The lowest number of leaves plant^{-1} (48.23)was observed under control treatment, which was received no organic manures and inorganic fertilizers.

At harvest stage also, application of 75%RDF-N(NCU)+P(EMPC)+SWE(T_8) recorded significantly highest number of leaves plant^{-1}(80.80). Application of 75%RDF-(NCU)+SWE (T_6) recorded the number of leaves plant^{-1} of 78.70 was on par with T_7 which was received 75%RDF - P(EMPC)+SWE (T_8). However, the lowest number of leavesplant^{-1}(61.64)was noticed in T_1.

This increase due to synergistic effect of organic manures in making available more plant nutrient by improving the soil physical condition and solubilizing the nutrients (3). The increased in growth may also due to readily available N from the inorganic fertilizers which would be responsible for better growth in bhendi (6). The maximum number of leaves plant^{-1} recorded in this treatment clearly indicated that vegetative growth was higher in plots that received integrated application of pressmud compost and inorganic fertilizers. This also might be due to the fact that the application of NPK fertilizers and pressmud compost provided adequate N which is associated with high photosynthentic activity and vigorous vegetative growth. The sea weed extract spray @ 20 ppm recorded the highest number of

leaves plant^{-1} in cluster bean. It was probably due to the presence of growth promoting hormones and more nutrients in the sea weed extract. The increasing number of leaves plant^{-1}showed an increasing trend with inorganic fertilizers. The results of present study are in accordance with the findings of (2).

Leaf Area (cm^2)

The data on leaf area furnished in table 2, showed that significant differences with regard to leaf area among the various treatments. The highest leaf area of 294 cm^2 was recorded in T_8 (75% RDF + N(NCU) + P(EPMC) + SWE). This was followed by T_6 (75% RDF + N(NCU) + SWE) and T_7 (75% RDF + P(EPMC) + SWE) were registered the leaf area of 276 and 270, respectively. However, the leaf area was least in control treatment registered 192 cm^2.

Leaf area index

The data on leaf area index are presented in table 2. The leaf area index significantly differed with different treatments tried. There was a significant increase in leaf area index and highest (11.89) was observed under application of 75% RDF + N(NCU) + P(EPMC) + SWE (T_8). This was followed by 10.58 and 10.23 were noticed in T_6 and T_7 were received 75% RDF + N(NCU) + SWE and 75% RDF + P(EPMC) + SWE, respectively. application of 100% RDF registered the leaf area index of 9.05 and it was on par with 9.44 noticed in T_5(75% RDF + N(NCU) + P(EPMC). However, the lowest leaf area index of 7.09 was observed with T_1 (control). The highest leaf area index (11.89) in ambrette could be due to production and maintenance of more green leaves. It may be due the availability of more nutrients in treatment of 75% RDF –N(NCU) + P (EPMC) + SWE (T_8) followed by treatment 75% RDF – N(NCU) + SWE (T_6) (10.58). This was also due to proliferation of root system which esulted in better absorption of nutrients and there by better growth. Less leaf area index (7.09) in control treatment due to low availability of nutrients could be attributed to non – development of embryonic bud of plant to its potential and retardation of cell division in the growing tips.

The maximum leaf area index could be also due to the fact that plant with sufficient nitrogen rates helps in photosynthesis and exhibits vigorous plant growth and development. Since, nutrients in organic manure are released gradually through the process of mineralization maintaining optimal soil nutrient levels over prolonged period of time. Neem coated urea together with organic manure might have resulted in higher number of leaves plant^{-1} and leaf area index.

Chlorophyll content (%)

It can be also inferred from the data, application of different combinations of inorganic fertilizers, neem coated urea, enriched pressmud compost and sea weed extract significantly increased chlorophyll content from 0.6 to 1.11% and are presented in table 2. The chlorophyll content significantly increased due to different treatments. Application of 75% RDF + N(NCU) + P(EPMC) + SWE (T_8) recorded the highest chlorophyll content (1.11%). Application of application of 75% RDF + N(NCU) + SWE (T_6) recorded the chlorophyll content of 1.01%. This was on par with 75% RDF + P(EPMC) + SWE (T_7) recorded the chlorophyll content (0.98%). Whereas the lowest chlorophyll content of 0.65% was recorded under control treatment (T_1) which received no organic manures and inorganic fertilizers. This could be also attributed to balanced C:N ratio, synthsesis of certain amino acids , production of growth promoting substances by organics and improvement in soil physical ,chemical and biological properties which might have collectively lead to an improvement in quality attributes .

Number of pods plant^{-1}

The highest pod yield plant^{-1}(65.48 g) was observed under T_8 which received 75% RDF + N(NCU) + P(EPMC) + SWE. The next best pod yield plant^{-1} of 62.23, 54.84, 44.39 and 45.11 were found to be T_6, T_7, T_2 and T_5, respectively. The treatment T_6 was on par with T_7 which received 75% RDF + P(EPMC) + SWE. Whereas the lowest pod yield plant -1 of 30.43 was noticed under control treatment which received no organic manures and inorganic fertilizers.. The increase in pod yield could be attributed to the neem oil coating and slow nutrient releasing property of neem coated urea which could have thereby reduced the nutrients losses and maintained the availability of nutrients for a longer time that resulted in better growth parameters thus increasing the marketable pod yield. Similar result was reported by (5) in rice crop. This was also might be due to integrated application of NPK and

pressmud compost accelerated mobility of photosynthates influenced by plant hormones from the source to sink.

CONCLUSION

In conclusion, it may stated that conjoint application of neem coated urea, enriched pressmud compost and sea weed extract markedly increased the number of leaves plant^{-1}, leaf area index, chlorophyll content of ambrette. Conjuctive use of neem coated urea, enriched pressmud compost and sea weed extract may be recommended for maximizing pod yield plant^{-1} in ambrette can be grown in sandy clay loam soil.

Table 1. Influence of inorganic fertilizers, neem coated urea (NCU), enriched pressmud compost (EPMC) and sea weed extract (SWE) on number of leaves plant^{-1} in ambrette

Treatments	30DAS	60DAS	90 DAS	120 DAS	At Harvest
T_1- Absolute control	9.69	18.85	34.43	48.23	61.64
T_2 – 100% RDF	16.00	31.14	47.77	59.89	72.16
T_3-75% RDF –N (NCU)	11.95	26.89	41.98	51.83	65.21
T_4- 75% RDF –P (EPMC)	12.65	27.64	44.23	52.40	66.22
T_5 -75% RDF –N (NCU)+ P (EPMC)	16.75	32.12	48.38	61.52	72.70
T_6 - T_3+SWE	19.01	38.14	58.13	65.77	78.70
T_7- T_4+SWE	18.99	37.12	55.65	64.87	77.53
T_8- T_5+SWE	20.17	43.34	63.95	68.79	80.80
S.Ed	**0.375**	**0.499**	**1.299**	**1.193**	**0.700**
CD=0.05	**0.888**	**1.181**	**3.073**	**2.821**	**1.656**

Table 2. Influence of inorganic fertilizers, NCU, EPMC and SWE on LAI, chlorophyll content and pod yield plant^{-1}in ambrette.

Treatments	Leaf area (cm^2)	Leaf area index	Chlorophyll content (%)	Pod yield plant^{-1}(g)
T_1- Absolute control	192	7.09	0.65	30.43
T_2 – 100% RDF	246	9.05	0.81	44.39
T_3-75% RDF –N (NCU)	225	7.75	0.70	39.36
T_4- 75% RDF –P (EPMC)	208	8.11	0.73	41.40
T_5 -75% RDF –N (NCU)+ P (EPMC)	251	9.44	0.84	45.11
T_6 - T_3+SWE	276	10.58	1.01	62.23
T_7- T_4+SWE	270	10.23	0.98	54.84
T_8- T_5+SWE	294	11.89	1.11	65.48
S.Ed	**5.27**	**0.203**	**0.02**	**0.996**
CD=0.05	**10.54**	**0.435**	**0.04**	**2.137**

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