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INFLUENCE OF INTEGRATED NUTRIENTS ON POD, SEED CHARACTERS AND YIELD OF AMBRETTE

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Abstract

Ambrette (*Abelmoschus moschatus* Medic.) is an aromatic and medicinal plant. It checks vomiting and cure diseases due to kapha and vatha and also useful in treating intestinal disorders. Neem coated urea significantly reduce nitrogen losses through ammonia volatilization and nitrate leaching. Pressmud from sugar mill is an enriched source of organic matter. Application of liquid seaweed fertilizer as a foliar spray significantly increases the growth parameters, yield attributes and yield of *Abelmoschus moschatus* Medic. The study comprised of eight treatments with different combinations of inorganic fertilizers, neem coated urea, enriched pressmud compost and sea weed extract. The experiment was laid out in Randomized Block Design (RBD) with three replications. Hence, a field investigation was carried out to assess the integrated effect of neem coated urea, enriched pressmud compost and sea weed extract along with inorganic fertilizers on pod, seed characters and yield of ambrette. The results revealed that application of 75% RDF + N(NCU) + P(EPMC) + SWE registered the highest yield attributes and yield (pod yield - 2361.32, seed yield – 1464. 59 kg ha^{-1}, respectively) in ambrette.

Key words: Ambrette, neem coated urea, enriched pressmud, sea weed extract & yield

Introduction

Ambrette (*Abelmoschus moschatus* Medic.) is an aromatic and medicinal plant that grows upto 1.5 m tall with varying shapes of leaves, large size yellow flowers, purple at centre. Fruit is a capsule or pod containing a large number of seeds are sweet, flowery, heavy fragrance similar to that of musk. It allay thirst, check vomiting and cure diseases due to kapha and vatha are useful in treating intestinal disorders, dyspepsia, urinary discharge, nervous debility, hysteria and skin diseases. Pressmud contains N, P and K of 1.15-3.0, 0.60-3.50 and 0.30 – 1.80 percent, respectively. It also contains crude protein, crude fiber, crude wax, SiO, CaO and MgO of 5-15, 15-30, 5-14, 4-10, 1-4 and 0.5-1.5percent, respectively. Lignin is a natural polymer having complex three dimensional structure, phenolic compounds. Cellulose contains glucose units. Hemi cellulose contains mannans, xylans and galactans. Which creates severe environmental pollution and health hazards if pressmud is not treated properly. Its application in soil lead to temporary lock up of nutrients as a result impaired C: N ratio and not beneficial to crop. Hence, composting is necessary to reduce lignin and cellulose content, there by the nutrient availability is improved. Sea weed extract is a macro algae rich in macro, micro nutrients and plant growth hormones used in farming in Britain, France, Japan and China (El-Kaoaua *et al.*, 2013). With this background, this field investigation was under taken to assess the integrated effect of neem coated urea, enriched pressmud compost and sea weed extract along with inorganic fertilizers on yield attributes and yield of ambrette.

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Materials and Methods

A field experiment was conducted at Farmer's Field Sivapuri Village, Chidambaram Taluk, Cuddalore District during *Kharif*, 2018. The weather at Sivapuri village was moderately warm with hot summer. The initial soil of the experimental field was sandy clay loam in texture with a pH- 7.6, EC- 0.42 dSm^{-1} and available N, P and K status were 241.2, 10.1 and 323.2 kg ha^{-1}, respectively. The main field was ploughed three times and brought to a fine tilth. The ambrette seeds were soaked in water for

12 hours before sowing. Two to three seeds per hill were sown at the depth of one cm and covered with sand. The experiment was laid out in Randomized Block Design (RBD) with three replications. The treatment details followed in the field experiment furnished in table 1. The ambrette crop was supplied with neem coated urea, enriched pressmud compost, sea weed extract and inorganic fertilizers as per the treatment schedule. Recommended dose of $N:P_2O_5:K_2O$ for ambrette is 120:30:40 kg ha^{-1} were applied in the form of urea, SSP and MOP, respectively. The test crop was grown to maturity with proper cultural practices and their yield attributes and yield due to different treatments were studied and recorded with statistical analysis as suggested by Gomez and Gomez (1984).

Results and Discussion

Pod characters

Number of pods plant^{-1}

The number of pods plant^{-1} ranged from 20.70 to 36.35 due to different treatments. The number of pods plant^{-1} was significantly high in T_8 (36.35). This was followed by T_6 (33.50) and T_7 (33.39) which received 75% RDF + N(NCU) + SWE and 75% RDF + P(EPMC) + SWE, respectively. These two treatments were on par with each other. The control treatment (T_1) recorded the least number of pods plant^{-1} of 20.70. Whereas the treatment T_2 statistically on par with T_5.

Pod length (cm)

The pod length significantly increased from 3.23 to 7.93cm due to application of different combinations of inorganic fertilizers, neem coated urea, enrichedpressmud compost and sea weed extract. Among the treatments tried, application of 75% RDF + N(NCU) + P(EPMC) + SWE registered the highest pod length of 7.93 cm over control (3.23 cm). Application of 100% RDF recorded the pod length of 5.12 cm was on par with T_5 (5.98 cm) which received 75% RDF + N(NCU) + P(EPMC). However, the lowest pod length of 3.23 was noticed in T_1 which received no organic manures and inorganic fertilizers.

Pod girth (cm)

The pod girth was maximum in T_8 (9.87). The next best pod girth values 9.00, 8.98 and 8.23 were found to be with T_6, T_7 and T_5, respectively. The treatment T_6 was on par with T_7. Similarly T_5 was on par with T_2. Whereas, control registered the minimum pod girth of 6.45 cm.

Pod dry weight (g)

Among the different treatments tested, application of 75% RDF + N(NCU) + P(EPMC) + SWE (T_8) registered significantly highest pod dry weight of 1.897 g compared to control recorded the pod dry weight of 1.299g. Application of 75% RDF + N(NCU) (T_3), 75% RDF + P(EPMC) (T_4) and 75% RDF + N(NCU) + P(EPMC) (T_5) registered the pod dry weight of 1.407, 1.452 and 1.610 g, respectively. The lowest pod dry weight of 1.299 g was observed with control treatment (T_1).

Pod yield (kg ha^{-1})

Among the various treatments tested, the highest pod yield ha^{-1} of 2361.32 kg was observed in T_8 which received 75% RDF + N(NCU) + P(EPMC) + SWE. It was followed by 2125.23 and 2141.78 kg were found to be with T_7(75% RDF + N(NCU) + SWE) and T_6(75% RDF + P(EPMC) + SWE), respectively. These two treatments were on par with each other. Application of 100% RDF (T_2) and 75% RDF + N(NCU) (T_3) registered the pod yield ha^{-1} of 1969.63 and 1768.43 g, respectively. There was a significant difference between these two treatments. However, the lowest pod yield ha^{-1} (1521.81 g) was noticed in T_1 which received no organic manures and inorganic fertilizers.

This increased yield attributes might be due to solubilization effect of plant nutrients by the addition of NPK through inorganic fertilizers and pressmud compost leading to increased uptake of NPK and improved the yield attributes. Similar findings were reported by Sharath Pal *et al.*, (2014). This was also due to beneficial effect of SWE contains various plant growth bio-assays and plant growth-regulatory substances. Furthermore, the wide range of growth

Table 1: Influence of integrated nutrients on number of pods plant^{-1}, pod length (cm), pod girth (cm) and pod dry weight (g) and pod yield (kg ha^{-1}) of ambrette.

Treatments	No. of pods plant^{-1}	Pod length (cm)	Pod girth (cm)	Pod dry weight (g)	Pod yield (kg ha^{-1})
T_1- Absolute control	20.70	3.23	6.45	1.299	1521.81
T_2– 100% RDF	26.02	5.12	8.13	1.598	1969.63
T_3- 75% RDF –N (NCU)	22.89	4.08	7.29	1.407	1768.43
T_4- 75% RDF –P(EPMC)	23.01	4.14	7.32	1.452	1810.38
T_5-75% RDF –N (NCU) + P (EPMC)	28.39	5.98	8.23	1.610	1995.70
T_6- T_3+SWE	33.50	7.19	9.00	1.752	2141.78
T_7- T_4+SWE	33.39	6.98	8.98	1.745	2125.23
T_8- T_5+SWE	36.35	7.93	9.87	1.897	2361.32
S.Ed	1.172	0.337	0.346	0.064	49.842
CD=0.05	2.525	0.723	0.743	0.138	106.912

Table 2: Influence of integrated nutrients on seed characters and seed yield of ambrette.

Treatments	No. of seeds pod^{-1}	Seed weight pod^{-1}(g)	100 seed weight (g)	seed yield (kgha^{-1})
T_1- Absolute control	53.00	0.58	0.92	862.43
T_2- 100% RDF	65.66	1.10	1.17	1036.64
T_3- 75% RDF –N (NCU)	60.66	0.79	1.04	947.12
T_4- 75% RDF –P(EPMC)	62.08	0.84	1.06	975.20
T_5-75% RDF –N (NCU) + P (EPMC)	65.71	1.14	1.19	1051.62
T_6- T_3+SWE	66.66	1.43	1.26	1207.83
T_7- T_4+SWE	66.67	1.40	1.27	1250.82
T_8- T_5+SWE	69.67	1.69	1.35	1464.59
S.Ed	1.086	0.118	0.056	32.085
CD=0.05	2.172	0.253	0.112	64.120

responses induced by seaweed extracts implies the presence of more than one group of plant growth promoting substances or hormones (Zodape *et al.,* 2008).

Seed Characters

Number of seeds pod^{-1}

Significant differences in the number of seeds pod^{-1} were observed among the various treatments. The treatment T_8 - 75% RDF + N(NCU) + P(EPMC) + SWE registered the highest number of seeds pod-1(69.66). The next best treatment was T_7 in which the number of seeds pod-1 of 66.67 was recorded. The number of seeds pod^{-1} was the least (53.0) noticed in T_1. The treatments T_6 and T_7 aswell as T_2 and T_5 were on par with each other.

Seed weight pod^{-1}(g)

Among the different treatments tested, application of 75% RDF + N(NCU) + P(EPMC) + SWE (T8) registered the highest seed weight pod^{-1} of 1.69 g. This was significantly differed with the next best seed weight pod^{-1} of 1.43 found to be with T_6 which received 75% RDF + N(NCU) + SWE. The treatment T_6 was on par with T_7 (1.40 g) which received 75% RDF + P(EPMC) + SWE. Application of 100% RDF (T_2) registered the seed weight pod^{-1} of 1.10 g significantly comparable with (T_1) (0.58 g) which received no organic manures and inorganic fertilizers.

100 seed weight (g)

Application of 75% RDF + N(NCU) + P(EPMC) + SWE (T_8) recorded the highest 100 seed weight of 1.35 g compared to control registered the lowest 100 seed weight of 0.92 g. Application of 100% RDF (T_2), 75% RDF + N(NCU) (T_3), 75% RDF + P(EPMC) (T_4) registered the 100 seed weight of 1.17, 1.04 and 1.06 g, respectively. These treatments were on par with each other. There was a significant difference noticed between T_8 and T_6 only and other treatments were statically non-significant.

The maximum 100 seed weight of 1.35g recorded in the treatment 75% RDF –N(NCU) + P (EPMC) + SWE (T_8) followed by treatment 75% RDF –N(NCU) + SWE (T_6) (1.27 g). The results are in line with the findings of Thirunavukkarasu *et al.,* (2014).

Seed yield (kg ha^{-1})

Among the various treatments tested, application of 75% RDF + N(NCU) + P(EPMC) + SWE (T_8) recorded the highest seed yield (1664 kg ha^{-1}). This was followed by T_6 and T_7 registered the seed yield of 1407 and 1450 kg ha^{-1} were on par. The treatments *viz.,* T_2. T_3 and T_4 recorded the seed yield of 1206, 1047 and 1105 kg ha^{-1}, respectively. However, the treatment T_1 recorded the lowest seed yield (862.43 kg ha^{-1}). The highest seed yield might be also by application of pressmud compost along with NPK fertilizers improved nutritional environment in the rhizosphere as well as its utilization in the plant system and enhanced translocation of nutrients to reproductive structures (Vijay Kumar, 2016). Application of sea weed extract improved chlorophyll content that enhanced photosynthetic parameters were positively correlated with seed yield, while antioxidant capacity was negatively correlated with photosynthesis and seed yield. These results are in agreement with the finding of Rajeswari and Arumugam Shakila (2015).

Conclusion

Hence, from the results of this present investigation it may stated that conjoint application of 75% RDF + N(neem coated urea) + P (enriched pressmud compost @ 1000 kg ha^{-1}) and sea weed extract @ 5% three sprays at 30 days interval markedly increased the number of pods plant^{-1}, Pod length (cm), pod girth (cm), pod dry weight (g), pod yield (kg ha^{-1}), number of seeds pod^{-1}, seed weight pod^{-1}, 100 seed weight and seed yield (kg ha^{-1}) of ambrette.

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