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Original Research Article

Impact of Integrated Nutrient Management on Soil Fertility and Yield of Kawach Beej

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Keywords

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ABSTRACT

An experiment was conducted at Nagarjun medicinal plants garden Akola, Dr. PDKV, Akola during the *kharif* 2016-17. The experiment was laid out in Randomized Block Design with nine treatments replicated three times. The adoption of integrated nutrient management significantly influenced the physical, chemical and fertility status of soil besides increase the yield and uptake by kawach beej. Based on the observations as defined in programme of research work significantly highest available N (190.56 kg ha^{-1}), P (28.56 kg ha^{-1}), K (342.70 kg ha^{-1}) were recorded with 5 t FYM ha^{-1} + N:P @ 25.0: 50 kg ha^{-1} followed by 5 t FYM ha^{-1} with N:P @ 12.5: 25.0 kg ha^{-1}, while the highest yield and uptake of kawach beej was measured in treatment T_9 with the application of 5 t FYM ha^{-1} + N:P @ 25.0: 50 kg ha^{-1}. The NPK uptake registered maximum in treatment T_9 i.e. 5 t FYM ha^{-1} + N: P @ 25.0: 50 kg ha^{-1} (174.46, 30.24, 85.21 kg ha^{-1} respectively) and it was followed by T_8 with 5 t FYM ha^{-1}+N and P @ 12.5: 25 kg ha^{-1} (157.23, 26.09, 79.88 kg ha^{-1} respectively). Its might be due to the addition of organic manures help to increased uptake of nutrients.

Introduction

Medicinal plants play an important role in the development of potent therapeutic agents. Herbal drugs form the backbone of the invaluable traditional medicinal practices. Recently interest in medicinal plant research has increased all over the world. It has been reported that medicinal plants used in various traditional systems have immune potential against various diseases.

Kawach beej is a green manure cover crop widely promoted as a means to reverse or slow negative effect of land use intensification. Its high herbage yield is an indication of good mulch for soil and possibly forages for livestock, depending on its palatability. Therefore, when incorporated into the soil as green manure, these cover crops can substantially improves the soil fertility. Moreover, the narrow C: N ratio facilitates their rapid decomposition to provide available nutrients to the crops.

Chemical fertilizers have played a significant role in Indian agriculture facilitating green revolution and making the country self-reliant in crop production. However, concentrated and continuous use of chemical fertilizers deteriorate the soil health, leading to acidification, micro nutrient depletion, soil degradation, reduction in the activity of soil micro flora and fauna, poor crop health and lower crop yields and quality. Besides, use of fertilizers may contribute to environmental risks like increase in global temperature, ground and surface water pollution, etc. In view of this, the integrated nutrient management offers scope to mitigate the above problems especially to medium and large farmers who can create their own organic manurial resources or do recycling of farm waste. Recent years, a concept of integrated nutrient supply involving use of organic manures and inorganic fertilizers has been developed to obtain sustained agricultural production (Gaikwad and Puranik, 1996).

The integrated nutrient supply through chemical fertilizers, FYM, wheat straw and green manuring, increased the soil organic carbon, available S, Mn and Fe in the soil, while available Cu and Zn remained unaffected over the application of all nutrients through fertilizers Hegde (1996).

The residual effect of nutrient management along with dry matter of kawach beej on soil fertility under kawach beej onion sequence and the results clearly revealed that nutrient management using kawach beej residue incorporation not only improved the soil properties like pH, EC and organic corbon but also improved the soil fertility Gharpinde *et al.,* (2015).

Integrated nutrient management involves the judicious mixture of organic, inorganic manures along with biofertilizers which maintains soil fertility, productivity & ultimately causes a significant reduction in chemical fertilizers which is cost effective. It maintains the soil fertility to an optimum level for crop productivity to obtain the maximum benefit from all possible sources of plant nutrients organics as well as inorganics in an integrated manner (Aulakh and Grant 2010). INM is also important for marginal farmers who cannot afford to supply crop nutrients through costly chemical fertilizers. In context of integrated nutrient management, organic manures are capable of supplying plant nutrients and improving soil physical environment having no definite chemical composition with low analytical value produced from animal, plant and other organic waste and by products. There are several indigenously available sources of nutrients of organic origin, in which FYM is widely used as organic manure but the availability of FYM is not adequate so, it becomes necessity of present day situation to look forward for another organic manurial source.

Materials and Methods

An experiment was conducted during the *kharif* 2016-17, to find out the "Impact of integrated nutrient management on soil properties of kawach beej" The experiment was conducted at Nagarjun medicinal plants garden Akola, Dr. PDKV, Akola. The experiment was laid out in Randomized Block Design with nine treatments replicated three times. The treatments comprised of unfertilized control, chemical fertilizers, organic viz., FYM alone and their combinations. The soil of experimental site was black belongs to Inceptisol. The nitrogen, phosphorous and potash content of the soil was 190.56 kg ha^{-1}, 28.56 kg ha^{-1}, 342.70 kg ha^{-1} respectively. The Local variety of kawach beej was used. The seed rate (30 kg ha^{-1}) and fertilizer dose was applied treatment wise for kawach beej crop. The seed rate was calculated on the area basis and seeds sown simultaneously in diblling method. treatment T_1 was unfertilizer control, T_2 and T_3 dose of FYM @ 2.5 t ha^{-1}, 5 t ha^{-1} respectively was applied and in treatment T_4, T_5 N: P 12.5: 25 kg ha^{-1}, 25: 50 kg ha^{-1} through inorganic chemical fertilizers and in treatment T_6, T_7, T_8 and T_9 where combination of T_2 and T_4, T_2 and T_5, T_3 and T_4, T_3 and T_5 respectively. The soil and plant samples were collected and analyzed for their different properties and the observation on fertility status of soil were recorded.

Results and Discussion

From Table 1. It is revealed that, the available NPK (kg ha^{-1}) and NPK uptake (kg ha^{-1}) affected significantly due to different treatments. Availalble N was recorded significantly more in treatment (T_9) which received 5 t FYM ha^{-1} + N:P @ 25.0: 50 kg ha^{-1} and it was at par with all the treatments except 2.5 t FYM ha^{-1} +N:P @ 12.5: 25 kg ha^{-1} (T_6), N:P @ 12.5: 25 kg ha^{-1}(T_4) and control (T_1) and available phosphorous was increased in treatment T_9 (28.56 kg ha^{-1}) with application of 5 t FYM ha^{-1} + N:P @ 25.0: 50 kg ha^{-1} and it was followed by treatments 5 t FYM ha^{-1}+N:P @ 12.5: 25.0 kg ha^{-1}(T_8), 2.5 t FYM ha^{-1}+N:P @ 25: 50 kg ha^{-1}(T_7) and 2.5 t FYM ha^{-1}+N:P @ 12.5: 25.0 kg ha^{-1}(T_6). These treatments were statistically at par with each other.

The available potassium was highest in T_9 (342.70 kg ha^{-1}) with the application of 5 t FYM ha^{-1} + N: P @ 25.0: 50 kg ha^{-1} and it was at par with all the treatments except T_6 (2.5 t FYM ha^{-1}+N: P @ 12.5: 25 kg ha^{-1}), T_3 (5 t FYM ha^{-1}) and T_1 (control). However, treatment T_1 where unfertilized control showed significantly lowest NPK (160.80, 19.12 and 312.80 kg ha^{-1} respectively) Similar result also reported by Sonune *et al.*, (2003) and Deshmukh *et al.*, (2012).

Table.1 Available NPK, uptake of NPK in soil and yield parameters of kawach beej as influenced by different treatments

Treatments	Available (kg ha^{-1})			Uptake (kg ha^{-1})			Yield (q ha^{-1})		
	N	P	K	N	P	K	Straw	Pod	Seed
T_1 -Control	160.80	19.12	312.80	70.26	9.05	30.91	23.40	10.68	8.76
T_2 -FYM @ 2.5 t ha^{-1}	181.42	22.29	335.23	111.82	15.11	53.54	39.30	15.25	12.30
T_3 -FYM @ 5t ha^{-1}	182.12	23.05	327.77	137.30	19.98	65.74	45.25	19.31	15.21
T_4 -N:P @ 12.5: 25 kg ha^{-1}	168.48	23.69	338.71	113.44	16.65	55.35	38.30	16.37	13.10
T_5 -N:P @ 25.0: 50 kg ha^{-1}	177.88	24.40	334.98	133.14	19.78	64.93	44.35	19.15	15.20
T_6 -FYM @ 2.5 t ha^{-1} + N:P @ 12.5: 25 kg ha^{-1}	170.92	26.44	323.56	138.29	21.19	69.45	46.63	18.60	14.53
T_7 -FYM @ 2.5 t ha^{-1} + N:P @ 25.0: 50 kg ha^{-1}	175.84	26.43	338.93	145.37	24.13	74.52	48.19	19.91	15.32
T_8 -FYM @ 5 t ha^{-1} + N:P @ 12.5: 25 kg ha^{-1}	187.19	27.79	338.97	157.23	26.09	79.88	50.64	22.31	16.65
T_9 -FYM @ 5 t ha^{-1} + N:P @ 25.0: 50 kg ha^{-1}	190.56	28.56	342.70	174.46	30.24	85.21	52.01	25.84	18.73
SE (m)±	4.91	0.64	4.06	2.62	0.43	1.30	1.78	0.46	0.72
CD (P=0.05)	14.72	1.91	12.16	7.86	1.28	3.90	5.32	1.39	2.16

Uptake of NPK registered maximum in treatment T_9 i.e. 5 t FYM ha^{-1} + N: P @ 25.0: 50 kg ha^{-1} (174.46, 30.24, 85.21 kg ha^{-1} respectively) and it was followed by T_8 with 5 t FYM ha^{-1}+N and P @ 12.5: 25 kg ha^{-1} (157.23, 26.09, 79.88 kg ha^{-1} respectively). Its might be due to the addition of organic manures help to increased uptake of nutrients. Similar finding were also reported by Alekar *et al.*, (2015).

The yield of kawach beej (q ha^{-1}) was significantly influenced by various treatments. Straw, pod and seed yield of kawach beej was significantly maximum in treatment T_9 with 5 t FYM ha^{-1} + N:P @ 25.0: 50 kg ha^{-1} (Straw 52.01q ha^{-1}, pod 25.84q ha^{-1} and seed yield 18.73q ha^{-1}) and at par with treatment T_8 application of 5 t FYM ha^{-1} + N:P @ 25.0: 50 kg ha^{-1}. (Straw 50.64q ha^{-1}, pod 22.31q ha^{-1} and seed yield 16.65q ha^{-1}) and the lowest yield was found in treatment T_1 (Straw 23.40, pod 10.68q ha^{-1} and seed yield 8.76q ha^{-1}) where unfertilized control was given.

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