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Effect of soluble NPK in combination with liquid manures on growth and yield of mustard (*Brassica juncea*) in Dehradun district of Uttarakhand

MahimaDOI: <https://doi.org/10.22271/chemi.2021.v9.i2p.11973>**Abstract**

A field experiment was conducted during the Rabi season 2019 – 2020 at Research Block of Shri Guru Ram Rai University, Dehradun, Uttarakhand, India with the view to find out the effect of soluble NPK in combination with liquid manures on growth and yield of mustard (*Brassica juncea*) in Dehradun district of Uttarakhand. Eight treatment were tested in R. B. D. with three replications. On the basis of experimental results, it was found that maximum plant height (102.83 cm), number of leaves per plant (20.13) and number of branches per plant (4.00) observed in treatment T₈ (soluble NPK 2% + Cow Urine 5%). The highest number of pods per plant (165.33), number of seed per pod (17.43) and seed yield (23q per ha) was recorded with the treatment where soluble NPK 2% + Cow Urine 5% was applied. The minimum number of yield attributes i.e. number of pods per plant (96.66), number of seed per pod (10.86) and seed yield (12.80 q per ha) was recorded in control plots.

Keywords: Soluble, NPK, combination, mustard, *Brassica juncea***Introduction**

Mustard is an important rabi oil seed crop of India. The oil content varies from 37 to 49%. According to the area India stand first in the world, whereas according to the productivity it is of second place after Canada. In Previous year, the average production of the country was quite low in comparison to the developed countries of the west. Therefore production of this crop needs to be increased as Indian mustard is mainly used for extraction of mustard oil while black mustard is mainly used as a spice (Anonymous, 2015) [2]. Mustard oil is used in soap making and as lubricant and illuminant (Leung and Foster, 1996) [3]. Dried/dehydrated mustard greens are available in the market as vegetables (Pruthi, 2001) [5].

To increase the production and productivity on mustard, it is necessary to identify the production constraints. Excess use of inorganic fertilizers has been found the major cause of low production as it degrade the fertility of and productivity of soil which result in poor crop yield. To overcome this problem combine application of soluble NPK and liquid manures is being adopted now a days. It has been recognized that N, P, K fertilizers alone are not always sufficient to provide balanced nutrition for optimal yield and quality of mustard (Jain and Sharma). Combine use of soluble NPK and liquid manures minimize the chemical source of nutrients and improve the productivity of mustard crop. Looking to the above facts the present study was carried out to find out effect of soluble NPK in combination with liquid manures on growth and yield of mustard (*Brassica juncea*) in Dehradun district of Uttarakhand.

Materials and Methods

A field experiment was conducted during the Rabi season 2019 – 2020 at Research Block of Shri Guru Ram Rai University, Dehradun, Uttarakhand, India. The soil of the experimental field was sandy loam in texture with a pH of 7.12. Eight treatments comprises; Control, Soluble NPK 2%, Soluble NPK 3%, Soluble NPK 4%, Soluble NPK 2% + Vermi Wash 2.5%, Soluble NPK 2% + Cow Urine 2.5%, Soluble NPK 2% + Vermi Wash 5%, Soluble NPK 2% + Cow Urine 5% were tested in Randomized Block Design with three replications. The mustard variety T-9 was sown on October 23, 2019 and harvested in Feb 8, 2020.

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Results and Discussion

Effect of soluble NPK in combination with liquid manure on growth parameters

Plant height: The data pertaining to number of pods per plant with respect to different treatments has been presented in (Table 1). The height of plant was recorded at 45, 70 days and at harvest. Data revealed that combined application of soluble NPK and Cow Urine gave significant result on plant height. The highest plant height (102.83) was recorded under treatment T₈ (soluble NPK 2% + Cow Urine 5%). On the other hand, the lowest plant height (80.66) was observed under treatment T₁ (Control).

Number of leaves per plant

Effect of soluble NPK in combination with liquid manures on number of leaves of plant has been presented in Table-2. Number of leaves per plant was recorded at 45, 70 days and at harvest. It is evident from the data that number of leaves was significantly highest under treatment T₈ (Soluble NPK 2% + Cow Urine 5%) whereas the minimum number of leaves was obtained with the treatment T₁ (Control).

Number of branches per plant

The number of branches of plant as affected by combined application of soluble NPK and liquid manures has been presented in (Table 3). The application of soluble NPK 2% and Cow Urine 5% gave maximum number of branches per plant (4.00) as compared to rest of the treatments. On the other hand, the minimum was (1.83) under treatment control at harvest stage.

Effect of soluble NPK in combination with liquid manures on yield attributes

Number of pods per plant: The data pertaining to number of pods per plant with respect to different treatments has been

presented in (Table 4). The number of pods per plant was recorded after harvest. Data revealed that combined application of soluble NPK and liquid manures gave significant result on number of pods per plant. The maximum number of pods per plant (165.33) was recorded under treatment T₈ (soluble NPK 2% + Cow Urine 5%), while the minimum number of pods per plant (96.66) was recorded under treatment T₁ (Control).

Number of seeds per pod

The data pertaining to number of seeds per pod with respect to different treatments has been presented in (Table 5). The number of grain per pod was recorded after harvest. Data show that combined application of soluble NPK and liquid manures gave significant result on number on number of seeds per pod. The maximum number of seed per pod (17.43) was recorded under treatment T₈ (soluble NPK 2% + Cow Urine 5%), while the minimum number of seed per pod (10.86) was recorded under treatment T₁ (Control).

Seed yield

Effect of soluble NPK in combination with liquid manures on seed yield of mustard has been presented in (Table 6). It is evident from the data that seed yield was significantly maximum under treatment T₈ (Soluble NPK 2% + Cow Urine 5%), whereas minimum seed yield was recorded under treatment T₁ (Control).

The maximum seed yield per ha (23.00 q) was recorded under treatment T₈ (Soluble NPK 2% + Cow Urine 5%), whereas the minimum seed yield per ha (12.80 q) was recorded under treatment T₁ (Control). The maximum seed yield might be due to combined application of NPK and Cow Urine. The higher rates of Urine application increased seed yield. The results are in agreement with the findings of (Mohanty *et al.* 2014)^[4]; Oliveira *et al.* (2009) and Singh *et al.* (2014)^[6].

Table 1: Influence of various treatments on plant height (cm) at different growth stages of mustard

| S. No. | Treatments | Days after sowing | | |
|----------------|----------------------------------|-------------------|--------|------------|
| | | 45 DAS | 70 DAS | At harvest |
| T ₁ | Control | 32.33 | 80.66 | 80.66 |
| T ₂ | Soluble NPK 2% | 45.06 | 88.9 | 88.9 |
| T ₃ | Soluble NPK 3% | 40.93 | 92.66 | 93.33 |
| T ₄ | Soluble NPK 4% | 45.86 | 100.66 | 101.53 |
| T ₅ | Soluble NPK 2% + Vermi Wash 2.5% | 35.00 | 87.33 | 89.00 |
| T ₆ | Soluble NPK 2% + Cow Urine 2.5% | 33.93 | 89.83 | 91.66 |
| T ₇ | Soluble NPK 2% + Vermi Wash 5% | 45.33 | 96.16 | 96.33 |
| T ₈ | Soluble NPK 2% + Cow Urine 5% | 47.06 | 102.00 | 102.83 |
| | S.Em± | 4.64 | 4.07 | 4.07 |
| | CD at 5% | 8.17 | 7.16 | 7.16 |

Table 2: Influence of various treatments on number of leaves per plant at different growth stages of mustard

| S. No. | Treatments | Days after sowing | | |
|----------------|----------------------------------|-------------------|--------|------------|
| | | 45 DAS | 70 DAS | At harvest |
| T ₁ | Control | 8.50 | 9.33 | 10.00 |
| T ₂ | Soluble NPK 2% | 9.26 | 10.93 | 11.93 |
| T ₃ | Soluble NPK 3% | 8.66 | 11.00 | 12.16 |
| T ₄ | Soluble NPK 4% | 10.00 | 13.53 | 16.26 |
| T ₅ | Soluble NPK 2% + Vermi Wash 2.5% | 9.00 | 10.16 | 13.00 |
| T ₆ | Soluble NPK 2% + Cow Urine 2.5% | 9.26 | 12.26 | 13.83 |
| T ₇ | Soluble NPK 2% + Vermi Wash 5% | 10.00 | 13.53 | 16.26 |
| T ₈ | Soluble NPK 2% + Cow Urine 5% | 12.00 | 17.96 | 20.13 |
| | S.Em± | 1.68 | 2.44 | 1.81 |
| | CD at 5% | NS | NS | 0.82 |

Table 3: Influence of various treatments on number of branches per plant at different growth stages of mustard

| S. No. | Treatments | Days after sowing | | |
|----------------|----------------------------------|-------------------|--------|------------|
| | | 45 DAS | 70 DAS | At harvest |
| T ₁ | Control | 1.10 | 1.83 | 1.83 |
| T ₂ | Soluble NPK 2% | 1.43 | 2.63 | 2.63 |
| T ₃ | Soluble NPK 3% | 1.53 | 3.00 | 3.00 |
| T ₄ | Soluble NPK 4% | 2.33 | 3.20 | 3.20 |
| T ₅ | Soluble NPK 2% + Vermi Wash 2.5% | 1.56 | 2.00 | 2.00 |
| T ₆ | Soluble NPK 2% + Cow Urine 2.5% | 1.60 | 2.33 | 2.33 |
| T ₇ | Soluble NPK 2% + Vermi Wash 5% | 1.76 | 2.96 | 2.96 |
| T ₈ | Soluble NPK 2% + Cow Urine 5% | 2.93 | 4.00 | 4.00 |
| | S.Em± | 0.46 | 0.55 | 0.55 |
| | CD at 5% | 0.82 | 0.96 | 0.96 |

Table 4: Influence of various treatments on yield attributes of mustard

| S. No. | Treatments | Number of pod per plant | Length of pod per plant (cm) | Number of seed per pod |
|----------------|----------------------------------|-------------------------|------------------------------|------------------------|
| T ₁ | Control | 96.66 | 4.00 | 10.86 |
| T ₂ | Soluble NPK 2% | 100.00 | 4.16 | 14.40 |
| T ₃ | Soluble NPK 3% | 110.00 | 4.36 | 14.53 |
| T ₄ | Soluble NPK 4% | 128.00 | 4.60 | 15.70 |
| T ₅ | Soluble NPK 2% + Vermi Wash 2.5% | 116.33 | 4.06 | 12.00 |
| T ₆ | Soluble NPK 2% + Cow Urine 2.5% | 123.33 | 4.16 | 13.33 |
| T ₇ | Soluble NPK 2% + Vermi Wash 5% | 133.33 | 4.36 | 14.90 |
| T ₈ | Soluble NPK 2% + Cow Urine 5% | 165.33 | 5.00 | 17.43 |
| | S.Em± | 18.13 | 0.35 | 1.69 |
| | CD at 5% | 31.91 | NS | 2.98 |

Table 5: Influence of various treatments on seed yield, stalk yield and harvest index of mustard

| S. No. | Treatments | Seed yield (q per ha) | Stalk yield (q per ha) | Harvest index (%) |
|----------------|----------------------------------|-----------------------|------------------------|-------------------|
| T ₁ | Control | 12.80 | 48.90 | 20.73 |
| T ₂ | Soluble NPK 2% | 14.35 | 56.76 | 20.19 |
| T ₃ | Soluble NPK 3% | 15.11 | 56.09 | 20.89 |
| T ₄ | Soluble NPK 4% | 20.03 | 68.76 | 22.74 |
| T ₅ | Soluble NPK 2% + Vermi Wash 2.5% | 15.11 | 56.09 | 21.29 |
| T ₆ | Soluble NPK 2% + Cow Urine 2.5% | 19.02 | 66.43 | 22.26 |
| T ₇ | Soluble NPK 2% + Vermi Wash 5% | 20.02 | 68.76 | 22.74 |
| T ₈ | Soluble NPK 2% + Cow Urine 5% | 23.00 | 75.69 | 23.32 |
| | S.Em± | 0.92 | 2.31 | 1.30 |
| | C.D at 5% | 1.62 | 4.08 | NS |

Conclusion

On the basis of experimental results the application of Soluble NPK 2% + Cow Urine 5% recorded highest growth and yield parameters as compared to rest of the treatments.

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