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Effect of integrated nutrient management in-mustard (*Brassica juncea* L.)

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Abstract

A field experiment was allotted throughout 2021-2022 to envision the result of Integrated Nutrient Management and None on Mustard (*Brassica napus* L.) Observations were recorded for Growth attributes, Yield attributes and yields, Nutrient content and uptake by mustard crop, Soil quality, economy in several combos. The comparative overall performance of 7 newly launched cultivars of rapeseed-mustard, specifically Hyola PAC-401 (*Brassica napus* L.), Jagannath, Kranti, Rohini and TERI(OE) M21-Swama advocated basal dose of nitrogen, phosphorus and potassium, turned into studied beneath Neath the agro-climatic situations of western Uttar Pradesh. Application of basal ninety kg N+30 kg P + 30 kg K/ha proved quality for seed and oil yield of the 3 cultivars. The inclusion of sulphur withinside the basal nitrogen, phosphorus and potassium fertilizers proved useful for the rapeseed-mustard crop, with 90 kg N+30 kg P + 30 kg K + 50 kg S/ha giving quality results. Split application of nitrogen and phosphorus (basal + foliar) proved useful for this crop, with basal 70 kg N + 28 kg P + foliar 20 kg N + 2 kg P/ha giving higher results. Inclusion of a small amount of sulphur (2kg S/ha) withinside the spray containing nitrogen and phosphorus (20 kg N + 2 kg P/ha) stepped forward the overall performance of the crop further. to position the above in a nut shell it can be concluded that the genetic capacity of the 2 erucic acid unfastened cultivars of rapeseed-mustard, specifically Hyola PAC-401 and TERI(OE) M21-Swama, and one regionally famous excessive yielding cultivar (Rohini) might be fully found out in the event that they had been grown with a sub-non-obligatory dose of 70 kg N + 28 kg P/ha withinside the presence of 30 kg K/ha, supplemented with the mixed foliar spray of 20 kg N+2 kg P + 2 kg S/ha. However, if the spray centers aren't available (as withinside the case of bad and marginal farmers of Uttar Pradesh), the crop must be grown with a basal dressing of 90 kg N + 30 kg P + 30 kg K/ha the use of unmarried superphosphate as a mixed supply of phosphorus and sulphur.

Keywords: Mustard (*Brassica napus* L.), Hyola, pac-401

Introduction

The vegetable oils have extra share of polyunsaturated fatty acids and are greater fluid than the ones composed of saturated fatty acids. The vegetable oils also are a terrific supply of required ratio of omega-6 and omega-three fatty acids and herbal antioxidants and are regarded to lessen the danger of cardiac illnesses and to beautify the first-class of existence. In addition, non-suitable for eating seen oils additionally play a vital function in ordinary existence because of their price as substitutes in industries engaged in generating fuel, grease, hair oil, soap, lubricant, paint, varnish, etc. The important oilseeds consist of castor, coconut, groundnut, linseed, Niger, rapeseed-mustard, safflower, sesame, soybean and sunflower. The crop is cultivated in fifty-three nations spreading normal the five continents throughout the globe, protecting a place of 24.2 million hectares with a mean yield of 1451 kg/ha and internet a complete manufacturing of 13.1 million heaps. In India, rapeseed-mustard ranks second after groundnut in vicinity and manufacturing. The crop occupies a place of about 6.eighty-one million hectares with a manufacturing of approximately 6.ninety-six million heaps of seeds, in particular in northern plains, contributing 40.7% and 47.9% to the Asian hectareage and manufacturing and 28.three% and 19.8%, to the arena hectareage and manufacturing, respectively. Of the overall oilseed manufacturing in India, rapeseed mustard bills for 27.8% fi-om a hectareage of 25.6%. In India, seven rapeseed-mustard types, belonging to the own circle of relatives Brassicaceae, are grown and account for 65% of the overall rabi oilseed crops.

These rapeseed-mustard bureaucracy consist of Indian mustard, normally referred to as Rai or Raya or Laha (*Brassica juncea* L. are the vital reasserts of suitable for eating oil in India. According to rapeseed-mustard is produced with inside the states of Assam (2.1%), Bihar (1.2%), Gujarat (7.1%), Haryana (13.4%), Madhya Pradesh (10.1%), Punjab (1.7%), Rajasthan (39.9%), Uttar Pradesh (18.8%) and West Bengal (4.2%).

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The common yield of rapeseed-mustard in India (1022 kg/ha) is a way at the back of the averages of different nations, like Canada-1288 kg/ha, China-1405 kg/ha, Germany-3096 kg/ha, UK-3231 kg/ha and France-3528 kg/ha. This became because of relatively low populace rely compounded with the aid of using very low in step with capita intake because the buying electricity of the hundreds became insufficient even to shop for their minimum dietary requirement of 12 kg/capita/12 months of oils and fats. None-the-much less, the non-stop exponential increase of populace offset the state of affairs a lot toward the near of the 20th century that, even with the fairly stronger buying electricity of the client the common intake of oils and fats (a meagre 8.2 kg/capita/12 months) became nonetheless a good deal brief of the minimum requirement (12 kg/capita/12 months). Even today, the Government of India is forced to import large portions of suitable for eating oils (greater than 1,000,000 heaps each 12 months) to replenish the distance among manufacturing and intake. Moreover, Indian rapeseed-mustard oil and cake are not so good as the ones of many different nations in particular for 2 reasons. First, rapeseed-mustard sorts normally grown in India include 40-50% erucic acid within side the seed, a way in extra of the preferred higher restriction of much less than 2%.

The hassle of low manufacturing of rapeseed-mustard in India can be traced to numerous factors. These consist of

1. Greater than 75% of the Indian farmers very own small or marginal holdings of much less than hectares,
2. The oilseeds are grown, generally, on rainfed and terrible first-class land, while farmers develop cereals which includes wheat and rice on irrigated and top first-class land,
3. Simplest 15% of the vicinity below oilseeds is below irrigation in comparison with 72% below wheat and 44% below rice,
4. Maximum farmers are blind to the strategies of cultivation of excessive yielding sorts, post-harvest era and right processing facilities,
5. Pests and illnesses lessen the yields in addition as oilseeds are greater vulnerable to these,
6. Familiar low temperature adversely influences flower bud improvement and thereby lowers seed yield and
7. Lack of understanding of the proper dose of fertilizers endorsed with the aid of using the Agriculture Department for a specific cultivar and region.

Further, the extensive hole in yields among stepped forward strategies, and farmers' practices wishes to be narrowed to get stronger productiveness and manufacturing (Kumar. For example, a Technology Mission on Oilseeds became installation in May 1986 to harness the capacity of oilseed manufacturing, included with higher processing and control technology which will gain self-sufficiency in assembly oilseeds demand. Recently a scheme 'Oilseeds Production Programmed (OPP)' has been sanctioned with the aid of using the authorities as much as the EX five-12 months plan and is possibly to hold for the duration of the X five-12 months plan with the goal to growth the manufacturing of oilseeds within side the use to gain self-sufficiency. Efforts are being made at diverse Indian Council of Agricultural Research (ICAR) laboratories and State Agriculture Universities to appreciably enhance the first-class of rapeseed-mustard cultivars. The Tata Energy Research Institute additionally initiated efforts

on this path and advanced numerous stepped forward first-class lines of rapeseed-mustard, that have low erucic acid content.

The first test became of an exploratory nature and became deliberate to research and evaluate the overall performance of 7 cultivars (consisting of erucic acid free) of rapeseed-mustard grown with a uniform endorse dose of vitamins below nearby agro-climatic conditions. The second test became deliberate at the 3 excellent acting Chinars of rapeseed-mustard of Experiment 1 decided on the idea of the facts for seed and oil yield and fatty acid composition of oil to decide the excellent aggregate of basal nitrogen and phosphorus for every of the 3 decided on cultivars of rapeseed-mustard below nearby conditions. Keeping their sulphur-wealthy nature in view, the 0.33 test became aimed whether or not the productiveness of the chosen rapeseed-mustard cultivars might be maximized with the aid of using inclusion of sulphur with inside the basal remedy containing nitrogen and phosphorus decided in Experiment 2. The fourth test became deliberate (I) to check whether or not or now no longer the productiveness of the chosen 3 cultivars (Experiment 2) might be stepped forward with the aid of using exploiting the method of foliar utility and (ii) to have a look at if addition of a small amount of sulphur with inside the spray containing nitrogen and phosphorus ought to beautify the yield in addition.

Materials and Methods

To meet the goals noted in Chapter 1, the responses of rapeseed-mustard to nitrogen, phosphorus and sulphur programs have been studied through undertaking 4 discipline experiments in the course of the 'rabi' (wintry weather) seasons of 2000-2003 on the Farm-cum-Botanical Garden of the Aligarh Muslim University, Aligarh. The summer time season extends from April to the cease of June and the common temperature for May is 34.5 °C and for June 34 °C, whereas, the acute most document is 45 °C and 45.5 °C respectively. On a median, four% of the full rainfall takes place in the course of this season the relative humidity of the wintry weather season stages among 56% and 77% with a median of 66.5%, that of the summer time season, among 37% to 49% with Extreme Maximum & Minimum mil) Mean Daily Maximum & Minimum a median of 43% and that of the monsoon season, among 63% and 73% with a median of 68%. Finally, 10 sq. m (4 x 2.5 m) plots have been organized in keeping with the layout of every test and irrigated gently earlier than sowing to preserve right moisture content material with inside the sub-floor of the soil. The Physio-chemical residences of the soil for every test have been received from the National Research Centre on Rapeseed-mustard, 38 Sear, Bharatpur (Rajasthan) and of 5 newly launched excessive yielding cultivars, specifically IGC-01 and Pusa Gaurav of *Brassica carinata* Braun, and Jagannath, Kranti and Rohini of *Brassica juncea* L. The first test become carried out in the course of the 'rabi' (winter) season of 2000-2001.

The test become deliberate to investigate and examine the overall performance of 7 cultivars of rapeseed-mustard under nearby agro-climatic condition the premise of physio-morphological variations in growth, yield and first-rate at the software of the advocated basal dose 80 kg N + 18 kg P + 30 kg K/ha (Ngo Pig K30). & Coss) and 5 newly launched excessive yielding cultivars, along with IGC-01 and Pusa Gaurav belonging to *Brassica carinata* Braun and Jagannath,

Kranti and Rohini of *Brassica juncea* L. Half of the dose of nitrogen, collectively with full dose of phosphorus and potassium, become implemented on the time of sowing. This test become carried out in the course of the 'rabi' (wintry weather) season of 2001-2002 on 3 excellent appearing cultivars of rapeseed-mustard decided on the premise of the records for seed yield and fatty acid composition of oil received in Experiment 1. The intention of this test become to decide the excellent mixture of basal nitrogen and phosphorus for every of 3 decided on cultivars of rapeseed mustard beneath nearby conditions. The sources of nitrogen and phosphorus have been urea and diammonium phosphate respectively. There have been all 5 nutrient remedies, 3 cultivars and fifteen remedy x cultivars interactions. The test protected 3 replications and become carried out in keeping with a factorial randomized block layout. This test become additionally carried out in the course of the 'rabi' (winter) season of 2001-2002.

The physiochemical evaluation of the soil of the sector is given in N B: A uniform basal dose of 30 kg K/ha become implemented on the time of sowing in view in their sulphur-wealthy nature, this test aimed to check whether or not the productiveness of the equal rapeseed-mustard cultivars as in Experiment 2 can be maximized through inclusion of sulphur with inside the basal remedies containing nitrogen and phosphorus decided on in Experiment 2. To deliver sulphur, diammonium phosphate (the supply of phosphorus in Experiment 2) become changed with unmarried superphosphate (a not unusual place supply of phosphorus and sulphur). Thus, the remedies additionally protected 0, 17, 34, 51 or 69 kg S/ha similarly to the chosen doses of nitrogen and phosphorus (Table four). Other practices have been similar to in Experiment 2. This ultimate test become completed in the course of the 'rabi' (wintry weather) season of 2002-2003. This test become deliberate (I) to check whether or not or now no longer the productiveness of time examined the chosen 3 cultivars (Experiment 2) can be advanced through exploiting the method of supplemental foliar software of nitrogen and phosphorus and (ii) to take a look at if addition of a small amount of sulphur with inside the spray containing nitrogen and phosphorus ought to decorate the yield further. The ultimate basal dose (N90P30K30) decided in Experiment 2 shaped the premise of the scheme of remedies of this test. The first intention become sought to be finished via foliar software of 20 kg/ha nitrogen and a couple of kg/ha phosphorus on flowers grown with a sub-superior basal dose of nitrogen and phosphorus decided after subtracting the quantity of leaf-implemented vitamins from it. 2 kgS/ha become protected with inside the spray remedy containing nitrogen and phosphorus.

Results and Discussion

Cultivars TERI (OE) M21-Swama gave 19.36 and 36.15% higher value at 45 and 60 DAS respectively than IGC01 which gave the minimum leaf number at both stages. Cultivar Hyola PAC-79.16 and 75.47% higher value at 45 and 60 DAS respectively than Pusa Gaurav which exhibited the minimum value at both stages at both stages, Hyola PAC-401 gave the maximum leaf area index and chinars Rohini and TERI (OE) M21-Swama, being at par, occupied the second position. Cultivar Hyola PAC-401 gave 55.76 and 61.25% higher leaf area index at 45 and 60 DAS respectively than Kranti which registered the minimum value particularly at 45 DAS Cultivar

TERI (OE) M21-Swama, showing parity with Kranti, produced maximum fresh matter at 45 DAS. However, at 60 DAS, Hyola PAC-401 gave the maximum fresh weight and Rohini and TERI (OE) M21-Swama, being at par, followed it. Cultivar TERI (OE) M21-Sawma gave 93.60% at 45 DAS and Hyola PAC-401, 98.61% at 60 DAS higher value than IGC-01 which registered the lowest value at both stages Among rapeseed-mustard cultivars, Rohini, Hyola PAC-401, TERI (OE) M21-Swama and IGC-01, being at par, produced more dry matter than others at both stages. Cultivar Rohini gave 31.50 and 36.41% higher value at 45 and 60 DAS respectively than Kranti which gave the lowest value at both stages cultivar Rohini, followed by Hyola PAC-401, gave the maximum net assimilation rate. Cultivar Hyola PAC401 gave 10.59 and 31.03% higher value at 45 and 60 DAS respectively than Kranti which registered the lowest value Among cultivars, Hyola PAC-401, followed by 11^{^-61^45^} DAS>nj TERI (OE) M21-Swama at 60 DAS, gave maximum leaf at both stages. Cultivar Hyola PAC-401 gave 15.92 and 10.85% higher value at 45 and 60 DAS respectively than Pusa Gaurav which exhibited the lowest value Cultivar Rohini, being at par with TERI (OE) M21-Swama and Hyola PAC-401, contained the maximum phosphorus content at 45 DAS. Cuhivar Hyola PAC-401 gave 9.21 and 4.25% higher value at 45 and 60 DAS respectively than Kranti which had the lowest content at 45 DAS, Hyola PAC-401, equalled by Rohini and TERI (OE) M21Swama, gave the maximum leaf potassium content. Rohini surpassed the minimum potassium containing cultivar Kranti by 10.98 and 9.11% at 45 and 60 DAS respectively. Among cultivars, Hyola PAC-401, followed by TERI (OE) M21-Swama, produced the maximum pods.

Cultivar Hyola PAC-401 gave 100.83% higher value than Jagannath which registered the lowest value for seeds per pod, cultivar Hyola PAC-401 proved superior to others were at par themselves. Cultivar Hyola PAC-401 showed 128.60% higher value than Kranti Cultivar TERI (OE) M21-Swama, equalled by Rohini, Jagannath, Pusa Gaurav and Hyola PAC-401, gave the maximum seed mass. Cultivar TERI (OE) M21-Swama showed 23.05% higher value than Kranti which registered the lowest value Cultivar Hyola PAC-401, followed by TERI (OE) M21-Swama, gave the maximum seed yield. Cultivar Hyola PAC-401 surpassed Jagannath which had the lowest value by 22.55% like seed yield, cultivar Hyola PAC-401, followed by TERI (OE) M21Swama, gave the highest oil yield. Cultivar Hyola PAC-401 showed 29.55% higher value than Kranti which had the lowest value among cultivars, Pusa Gaurav proved superior, however it was at par with IGC-01, Rohini, Jagannath, TERI (OE) M21-Swama and Hyola PAC-401. Cultivar TERI (OE) M21-Swama gave 149.40% higher value than Hyola PAC-401 which gave the lowest value. Cultivar Jagannath gave 157.46% higher value than Hyola PAC-401 which gave the lowest value Cultivar Kranti, followed by IGC-01, possessed the maximum erucic acid content. Cultivar Hyola PAC-401 produced 99.63% less erucic acid content than Kranti In this experiment, effect of five basal levels of nitrogen and phosphorus (NQFO, N30P10, N60P20, N90P30 and N120 P40) was studied on the performance of three cultivars of rapeseed-mustard (Rohini, Hyola PAC-401 and TERI (OE) M21-Swama) selected on the basis of the data of Experiment 1.

The effect of treatments as also cultivar differences alone as well as in combination were significant on all growth parameters studied at 45 and 60 DAS. Hyola PAC-401

exhibited 41.52% at 45 DAS and 58 32.56% at 60 DAS decrease in height in comparison with cultivar TERI (OE) M21-Swama. However, its effect was at par with that of N120P40 x TERI (OE) M21-Swama, N60P20xTERI (OE) M21-Swama, N90P30 x Rohini and N30P10 x TERI (OE) M21- Swama at 45 DAS and N120P40 x TERI (OE) M21-Swama, N60P20 x TERI (OE) M21-Swama, N30P10 x TERI (OE) M21-Swama and Nonpottery (OE) M21- Swama at 60 DAS. Interaction N90P30 x Hyola PAC-401 increased shoot length by 28.43 and 7.59% at 45 and 60 DAS respectively over NQPO X Hyola PAC401 which gave the lowest value. However, at 60 DAS, the effect of N90P30 x Hyola PAC-401 was at par with that of Knoop x Hyola PAC-401 However at 60 DAS, treatment N90P30, at par with N60P20. However, effect of N120P40 X Rohini was at par with that of N90P30 x Rohini, N90P30 x TERI (OE) M21-Swama and N120P40 x TERI (OE) M21-Swama at 45 DAS and of N90P30 x TERI (OE) M21-Swama was at par with that of N60P20 x TERI (OE) M21-Swama and N120P40 X TERI (OE) M21-Swama at 60 DAS. Interaction N90P30 Hyola PAC-401 registered 24.15 and 26.17% higher value at 45 and 60 DAS respectively than NOPQ X Rohini which gave the lowest value. It gave 40.94 and 84.48% higher value at 45 and 60 DAS respectively than TERI (OE) M21-Swama which registered the lowest value. Interaction N90P30 x Hyola PAC-401 registered 98.39% at 45 DAS and 118.82% at 60 DAS more leaf area than the lowest value giving interaction NQPO X Rohini and NQPO X TERI (OE) M21-Swama respectively. Treatment N90P30 gave 24.71 and 9.76% higher value than the control at 45 DAS and 60 DAS respectively. It produced 23.43% at 45 DAS and 27.53% at 60 DAS higher leaf area index than TERI (OE) M21-Swama which gave the lowest value. However, its effect was equalled by that of N60P20 x Hyola PAC-401, N,2oP4o X Hyola PAC-401, N30P10 x Hyola PAC-401, NQPO X Hyola PAC-401, N90P30 X Rohini and N90P30 x TERI (OE) M21-Swama at 45 DAS and with that of N120P40 X Hyola PAC-401, N60P20 x Hyola PAC-401, N30P10 x Hyola 401 showed 54.37% at 45 DAS and 39.32% at 60 DAS higher value than NQPO X Rohini which gave the lowest value. Interaction N90P30 x Hyola PAC-401 gave 53.06% at 45 DAS and 49.42% at 60 DAS higher fresh weight than NQPO X Rohini which had the lowest value. It gave 2.85% at 45 DAS and 8.07% at 60 DAS more dry matter than Rohini which gave lowest value. However, effect of N120P40 x TERI (OE) M21-Swama was at par with that of N90P30 x Hyola PAC-401, N120P40 X Hyola PAC-401, N120P40 x Rohini, N90P30 x TERI (OE) M21Swama and N60P20 X TERI (OE) M21-Swama at 60 DAS. It exhibited 10.05% at 45 DAS and 22.95% at 60 DAS higher carbonic anhydrase activity than Rohini which gave the lowest value. However, its effect was at par with that of N120P40 X Hyola PAC-401 at 45 DAS and with that of N60P20 xHyola PAC-401 at 60 DAS. Interaction N90P30 x Hyola PAC-401 gave 74.38% at 45 DAS and 40.47% at 60 DAS higher value than NQPO X Rohini which exhibited lowest activity.

Yield and Economic attributes

Treatment BN7OP28 + FN20P2S2 gave maximum value, however its effect was at par with that of BN70I>28 + FN20P2 and BN70P30 + FN20-Treatment BN7OP28 + FN20P2S2 gave 22.0% higher value than BN90P30 + Few (control). Regarding cultivars, TERI (OE) M21-Swama gave maximum value. It was equalled by Rohini. Cultivar Hyola

PAC-401 gave 27.26% less value than TERI (OE) M21-Swama. Among interactions, BN7OP28 + F20P2S2 x TERI (OE) M21-Swama gave maximum value. However, its effect was at par with that of BN7OP28 + FN2OP2S2 X Rohini, BN7OP28 + FN2OP2 X TERI (OE) M21-Swama, BN7OP30 + FN2O X Rohini, BN7OP28 + FN20P2 X Rohini and BN7OP30 + FN2O X TERI (OE) M21-Swama. Interaction BN7OP28 + FN2OP2S2 X Hyola PAC-401 showed 25.31% less value than BN7OP28 + FN20P2S2 X TERI (OE) M21-Swama.

Treatments BN7OP28 + FN2OP2S2 gave maximum leaf number. Its effect was followed by that of BN7OP28 + FN2OP2. Treatment BN7OP28 + FN2OP2S2 gave 19.27% higher value than the control. Cultivar TERI (OE) M21-Swama proved best. It was followed by Hyola PAC-401. Cultivar Hyola PAC-401 gave 10.49% less value than TERI (OE) M21-Swama. With regard to interaction effect, BN7OP28 + FN20P2S2 X TERI (OE) M21Swama gave maximum leaf number. Its effect was followed by that of BN7OP28.

Plant nutrient analysis

Treatment BN7OP28 + FN2OP2S2 gave maximum nitrogen content in leaf Its effect was followed by that of BN7OP28 + FN2OP2- Treatment BN7OP28 + FN2OP2S2 gave 2.13% more nitrogen in leaf than the control. With regard cultivar differences, TERI (OE) M21-Swama gave maximum value and was followed by Hyola PAC-401. Cultivar Hyola PAC-401 showed 3.53% higher value than Rohini which exhibited lowest value. Maximum leaf nitrogen content was observed with BN7OP28 + FN20P2S2 X Hyola PAC-401. However, its effect was at par with that of BN7OP28 + FN2OP2S2 X TERI (OE) M21-Swama, BN7OP28 + FN2OP2 X TERI (OE) M21-Swama, BN7OP30 + FN2O X TERI (OE) M21-Swama and BN90P30 + F^ xTERI (OE) M21-Swama. Interaction BN7OP28 + FN2OP2S2 X Hyola PAC-401 registered 6.57% more leaf nitrogen content than BN90P30 + F ^ X Rohini which gave minimum value.

Among treatments, BN7OP28 + FN20P2S2 gave maximum value. However, its effect was at par with that of BN70P28 + FN2OP2 and BNVOPSO + FN2O- Treatment BN70P28 + FN20P2S2 gave 5.56% higher value than the control. Cultivar differences and treatment x cultivar effect on this parameter were not significant.

Conclusion

The comparative performance of seven newly released cultivars of rapeseed-mustard, namely Hyola PAC-401 (*Brassica napus* L.), Jagannath, Kranti, Rohini and TERI (OE) M21-Swama (*Brassica juncea* L.) and IGC-01 and Pusa Gaurav (*Brassica carinata* Braun) raised with a uniform recommended basal dose of nitrogen, phosphorus and potassium, was studied under the agro-climatic conditions of western Uttar Pradesh. Application of basal 90 kg N+30 kg P + 30 kg K/ha proved best for seed and oil yield of the three cultivars. The inclusion of sulphur in the basal nitrogen, phosphorus and potassium fertilizers proved beneficial for the rapeseed-mustard crop, with 90 kg N+30 kg P + 30 kg K + 50 kg S/ha giving best results. Split application of nitrogen and phosphorus (basal + foliar) proved beneficial for this crop, with basal 70 kg N + 28 kg P + foliar 20 kg N + 2 kg P/ha giving better results. Inclusion of a small quantity of sulphur (2kg S/ha) in the spray containing nitrogen and phosphorus

(20 kg N + 2 kg P/ha) improved the performance of the crop further. to put the above in a nut shell it may be concluded that the genetic potential of the two erucic acid free cultivars of rapeseed-mustard, namely Hyola PAC-401 and TERI (OE) M21-Swama, and one locally popular high yielding cultivar (Rohini) could be fully realized if they were grown with a sub-optimal dose of 70 kg N + 28 kg P/ha in the presence of 30 kg K/ha, supplemented with the combined foliar spray of 20 kg N+2 kg P + 2 kg S/ha. However, if the spray facilities are not available (as in the case of poor and marginal farmers of Uttar Pradesh), the crop should be grown with a basal dressing of 90 kg N + 30 kg P + 30 kg K/ha using single superphosphate as a combined source of phosphorus and sulphur.

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