

THESIS ABSTRACTS
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**Soil Science and Agricultural
Chemistry**

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VASANTRAO NAIK MARATHWADA KRISHI
VIDYAPEETH, PARBHANI**

Title	-	Screening of potash solubilizing bacteria for plant growth promotional activity and nutrient uptake of brinjal
Researcher	-	Nihala Jabin, P.P.
Research Guide	-	Syed, Ismail
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	1701
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033099
Abstract	-	

Increasing cost of the fertilizers with lesser nutrient use efficiency necessitates alternate means to fertilizers. Soil microorganisms play a significant role in number of chemical transformations of soils and thus, influence the availability of macro- and micronutrients. Solubilization of soil mineral, by fungi and bacteria are well established. However, less information is available on K-solubilizing bacteria and their impact on growth and development of crop plants. Nine microbial strains and 0.1% of chemical source in three replications were tested for their *in vitro* ability of potassium solubilization using Aleksandrov media. Colony and halo zone diameters were measured after 72h incubation of the plates in incubator. potassium solubilizing ability of microbial strains in three replications was studied in broth assay also. Solubilization potential was assessed both qualitatively and quantitatively under *in vitro* conditions. The laboratory stock cultures KSB-W1 (*Bacillus sp*) KSB-PD-3-A, (*Bacillus sp*), KSB-NP-3 (*Bacillus sp*), KSB-PD-1-A (*Pseudomonas sp*), KSB-M-1 (*Pseudomonas sp*), KSB-M-2 (*Pseudomonas sp*), KSB-PD (*Sinorhizobium metallidans*), KSB-PD-1-B (*Sinorhizobium metallidans*), KSB-M-3 (*Sinorhizobium metallidans*) were selected from All India Network Project on Soil Biodiversity-Biofertilizers, VNMKV Parbhani and SKUAST, Kashmir on the basis of their potash solubilizing ability in laboratory condition. All the selected isolates found to solubilize insoluble potassium sources were screened for plant growth promotion in pot condition at Department of Soil Science and Agricultural Chemistry, Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani. The liquid broth of isolates @ 10 ml pot⁻¹ was applied.

Results of lab experiment indicated that, in plate assay among all the selected microbial strains, KSB-PD-1-A (*Pseudomonas sp*) formed highest colony diameter, halozone

diameter with highest solubilization efficiency and solubilization index in mica amended media and in broth assay also, KSB-PD-1-A (*Pseudomonas sp*) shows maximum potassium solubilization with highest reduction in pH followed by KSB-M-1 (*Pseudomonas sp*) and KSB-M-2 (*Pseudomonas sp*) in mica containing media. In pot culture experiment, KSB-PD-1-A (*Pseudomonas sp*) was found better strain in increasing growth attributes such as plant height and no. of leaves, shoot and root fresh weight and also dry weight, root shoot ratio and root density. KSB-PD-1-A (*Pseudomonas sp*) inoculated plants gave highest number of good quality fruits, nutrient content and uptake was also more in this plant. nutrient (both macro and micro) availability and microbial properties of soil was also better in this treatment compared to other strains. . Dehydrogenase activity was more in KSB-PD-1-A (*Pseudomonas sp*) inoculated soil, whereas acid and alkaline phosphatase enzyme activity was more in KSB- PD-3-A (*Bacillus sp*) inoculated soil, Potassium uptake in plant and potassium availability in soil was significantly improved with the inoculation of, KSB-PD-1-A (*Pseudomonas sp*) followed by KSB-M-1 (*Pseudomonas sp*) and KSB-M-2 (*Pseudomonas sp*) as compared to other potassium solubilizing microbial inoculants.

Title	- Studies on preparation of organic boosters and their evaluation
Researcher	- Kaldate, Sujata Ganeshrao
Research Guide	- Patil, V.D.
Department	- Soil Science and Agricultural Chemistry
Subject	- Soil Science and Agricultural Chemistry
Degree	- M.Sc
Thesis No.	- 1702
Krishikosh link	- http://krishikosh.egranth.ac.in/handle/1/5810033102
Abstract	-

The present investigation pertaining to “Studies on Preparation of Organic Boosters and Their Evaluation.” was carried out during the year 2016-2017 at Department of Soil Science and Agricultural Chemistry, College of Agriculture, Vasantrya Naik Marathwada krishi vidyapeeth, Parbhani. . The experiment was undertaken to prepare the different organic boosters and to evaluate the organic boosters for its composition. The data obtained from present investigation on preparation of organic boosters and their chemical, biological and enzymatic content was critically analyzed using various standard procedures.

The review collected from various literatures, the various organic preparations/boosters/formulations were prepared. Panchgavya was prepared by using nine ingredients viz. cow dung, cow urine, cow milk, curd, jaggery, cow ghee, banana, tender coconut water and water. Amrutjal was made by using cow urine, fresh cow dung, jaggery and water, where as Amrutmitti was prepared in pit by using ingredients like compost, FYM, cow dung, cow urine and Amrutjal. The protocol of Beejamrut was developed by using materials like cow dung, cow urine, lime, bund soil or compost and water. While, Jivamrut was prepared by using cow dung, cow urine, dicot pulse flour, jaggery and compost.

The pH of various organic boosters ranged from 5.32 to 7.62. The lowest pH was found in Jivamrut while highest pH was registered in Beejamrut. The electrical conductivity varied from 0.68 (Amrutjal) to 3.20 (Jivamrut) dSm⁻¹. The electrical conductivity of organic boosters found to be normal except Jivamrut which tends towards salinity. The maximum total organic carbon content was observed in Amrutmitti followed by Panchgavya while minimum total organic carbon was recorded in Amrutjal.

The high value of total nitrogen content was obtained in Panchgavya (1.40 %) while the minimum total nitrogen was reported in Beejamrut (0.14 %). The total phosphorus and potassium content was higher in Jivamrut, while total phosphorus was lowest in Amrutjal and lowest potassium was recorded in Beejamrut. Amrutmitti found to be higher in total calcium and sulphur while, Amrutjal was higher in total magnesium content.

The high concentration of the total iron, manganese, zinc, copper and boron was recorded in Amrutmitti. Where as lower concentration of iron and manganese was noticed in Beejamrut while, Amrutjal was low in zinc and copper.

The highest bacterial population and fungal population recorded in Panchgavya and actinomycetes population was raised in Beejamrut. Beejamrut showed higher dehydrogenase activity and highest phosphatase activity was registered in Panchgavya.

Title	- Effect of application of organic boosters on growth, yield, nutrient uptake and quality of tomato
Researcher	- Ravan, Supriya Maruti
Research Guide	- Patil, V.D.
Department	- Soil Science and Agricultural Chemistry
Subject	- Soil Science and Agricultural Chemistry
Degree	- M.Sc
Thesis No.	- 1703
Krishikosh link	- http://krishikosh.egranth.ac.in/handle/1/5810033105
Abstract	-

Pot culture experiment was conducted to study the effect of application of organic boosters on growth, yield, nutrient uptake and quality of tomato during *kharif* season of 2016-2017 at Department of Soil Science and Agricultural Chemistry, Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani. The experiment was carried out in order to study the effect of application of different organic boosters, chemical fertilizer alone and combination of organic manure with inorganic fertilizer on growth, yield, nutrient uptake, nutrient availability in soil and quality of tomato. The eight treatments compared of T₁: RDF only, T₂: RDF + FYM, T₃: Amrutjal, T₄: Jeevamrut, T₅: Bijamrut, T₆: Panchgavya, T₇: Amrutmitti, T₈: 100 % N Through FYM and fitted in completely randomised design with three replications. The soil and plant samples were collected at the time of flowering and harvesting stage and analysed for nutrient concentration and their uptake.

The results emerged out indicated significant increase in plant height, number of branches, number of leaves per plants and leaf area with combination of organic manure and chemical fertilizer at flowering and harvesting stage. The RDF + FYM (T₂) was found better as compared to organic boosters and chemical fertilizer alone. But the results were statistically at par with RDF only (T₁) and Panchgavya (T₆). Similarly, yield and yield attributing characters of tomato were also increased with RDF + FYM treatment (T₂) followed by RDF only (T₁) and Panchgavya (T₆). Further, concentration and uptake of major (NPK), and micronutrients (Zn, Fe, Cu and Mn) was also improved due to application of organic boosters and organic with inorganic fertilizer showing better results as compared to application of chemical fertilizer only. Nutrient availability at flowering and harvesting stages of tomato found better with organic boosters application. Quality in terms of ascorbic acid and TSS found to be improved with organic with inorganic fertilizer and organic boosters only.

Though, RDF + FYM showed best performance, however RDF only and Panchgavya were also found to be equally effective in quality improvement when compared with RDF + FYM treatment.

Title	- Characterization, classification and evaluation of physiography of soils of zari-naam river watershed (part-2) of parbhani district by using gis, gps and remote sensing
Researcher	- Dhole, Neminath Anandrao
Research Guide	- Waikar, S.L.
Department	- Soil Science and Agricultural Chemistry
Subject	- Soil Science and Agricultural Chemistry
Degree	- M.Sc
Thesis No.	- 1704
Krishikosh link	- http://krishikosh.egranth.ac.in/handle/1/5810033107
Abstract	-

The present investigation “Characterization, Classification and Evaluation of Physiography of Soils of Zari NAAM River Watershed (Part-2) of Parbhani District By Using GIS, GPS and Remote Sensing” was carried out during the year 2015-16. The total Length of watershed is 4.2 km and it is divided into Seven compartment and Three Parts viz. 1, 2 and 3. These three parts were surveyed and representative soil samples were collected by grid survey by using topographic map, remote sensing imagery and GPS locations. From these, 50 soil samples were drawn to study the properties and nutrient status. Further, the three representative soil profiles were excavated on the basis of soil depth and behavior of cracks. The water samples were collected for determining water quality and total water budget of NAAM river watershed was estimated for irrigation. The thematic maps of all important soil parameters were generated.

The results emerged out from the present investigation revealed that soils of NAAM river watershed (part-2) are Typic Haplusterts and Vertic Haplusterts. These soils are brown to black in colour. These soils are slightly to moderately alkaline in nature, safe in total soluble salt concentration, calcareous to highly calcareous and low supply with organic carbon.

In all, out of 50 soil samples, 41 samples are low and 9 samples are placed as very low in available N content. Available phosphorus content found to be very low for 2 samples and low for 48 samples. The availability of potassium found to be very high. The 37 soil samples are deficient and 13 soil samples are sufficient in available sulphur. These soils are found to be low in DTPA-Fe and Zn content, and rich in available copper and manganese.

The Zari NAAM river watershed has 9 primary 5 secondary drain lines. Out of 1153.31 ha area of Zari NAAM river (Part-2), 326.11ha, 805.85 ha and 21.35 ha area falls under 0 to 1, 1 to 3 and 3 to 6 per cent slope, respectively and water storage.

All water samples of NAAM river watershed were moderately alkaline. On the basis of salinity, safe for irrigation but need moderate leaching. The SAR and RSC values of water samples were safe suitable for irrigation.

Title	-	Studies on effect of graded levels of potassium and zinc on growth, yield, nutrient uptake and quality of pigeon pea
Researcher	-	Thamke, Sumedh Sanjay
Research Guide	-	Waikar, S.L.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	1730
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033260
Abstract	-	

A field experiment was conducted during *Kharif* season 2016-17 to studies on effect of graded levels of potassium and zinc on growth, yield, nutrient uptake and quality of pigeon pea at experimental farm, Department of Soil Science and Agricultural Chemistry, College of Agriculture, Vasanttrao Naik Marathwada Krishi Vidyapeeth, Parbhani. The experiment was laid out on Vertisols with eight treatments replicated three times in randomized block design. The treatment consists of T₁ - Absolute control, T₂ - Only RDF (25:50 kg N and P₂O₅ ha⁻¹), T₃ - RDF + 15 kg K₂O ha⁻¹, T₄ - RDF + 30 kg K₂O ha⁻¹, T₅ - RDF + 45 kg K₂O ha⁻¹, T₆ - RDF + 15 kg K₂O ha⁻¹ + 15 kg Zn ha⁻¹, T₇ - RDF + 30 kg K₂O ha⁻¹ + 15 kg Zn ha⁻¹, T₈ - RDF + 45 kg K₂O ha⁻¹ + 15 kg Zn ha⁻¹. The results clearly indicated that various growth and yield parameters like plant height, leaf area, number of pods, seed yield and dry matter yield was increased due to application of potassium and zinc. The highest test weight and seed protein content was recorded by application of 30 kg potassium with 15 kg zinc along with RDF. It was inferred from the results that application of 25 kg N, 50 kg P₂O₅, 30 kg K₂O ha⁻¹ + 15 kg Zn ha⁻¹ fertilizer found superior over only N and P application i.e. RDF (25:50 kg N and P₂O₅ ha⁻¹). An agronomic efficiency based on this 15 kg ha⁻¹ K₂O showed highest agronomic efficiency 7.46 kg kg⁻¹. The K application shows synergistic effects on other nutrients (N, P, Fe, Zn, Cu, Mn) uptake. Soil fertility was found to be improved due to application of potassium and zinc to pigeon pea. Thus, the maximum gross monetary return, net monetary return and monetary benefits was received inn treatment T₇ - RDF + 30 kg K₂O ha⁻¹ + 15 kg Zn ha⁻¹ with 1.89 B:C ratio. This finding has proved the balance nutrition is a need of nation.

Title	-	Assesment and refinement of technologies to overcome reddening in Bt cotton in Vertisols of Marathwada region
Researcher	-	Basava, Prasad, V.M.
Research Guide	-	Gaikwad, G.K.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	1734
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033317
Abstract	-	

A field experiment was conducted during *Kharif* season 2016-17 regarding assesment and refinement of technologies to overcome reddening in *Bt* cotton in Vertisols of Marathwada region at research farm of AICRP on Dryland Agriculture, College of Agriculture, Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani. The experiment was laid out with twelve treatments replicated three times in randomized block design in Vertisols. The growth and yield attributes like plant height, leaf area, number of bolls, boll weight, total biomass production, number of leaves and seed cotton yield were significantly improved by the application of RDF 125% through fertigation. The content of N,P,K and micronutrient(Zn, Fe, Cu, Mn) plant significantly improved by the application of fertilizers through fertigation. The anthocyanin content and reddening intensity decreases by application of RDF through fertigation + Reddening recommendation (2 sprays of MgSO₄ @ 0.2% at 55-60 DAS+ DAP 2% 2-3 sprays) which also showed significantly higher chlorophyll content. It was inferred from the results that application of RDF through fertigation + reddening recommendation (2 sprays of MgSO₄ @ 0.2% at 55-60 DAS+ DAP 2% 2-3 sprays) found superior over other treatments to reduce the intensity of reddening and significant amount of chlorophyll content in cotton leaves. Soil fertility after harvest of cotton was significantly improved due to application of fertilizers through fertigation.

Title	-	Evaluation of soil fertility status of pomegranate orchard by soil and leaf analysis in jalna district
Researcher	-	Patil, Akshay Bhagwan
Research Guide	-	Mane, S.S.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science
Degree	-	M.Sc
Thesis No.	-	1762
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033474
Abstract	-	

The present investigation entitled “Evaluation of soil fertility status of pomegranate orchard by soil and leaf analysis in Jalna district” for this purpose collected representative soil and leaf sample from the selected sixty orchards were analyzed for different parameters using standard procedure.

The pomegranate orchard soils were neutral to alkaline in reaction with the mean value of collected samples was 7.86 and electrical conductivity of pomegranate orchard soil was in safe limit for the crop growth with the mean value of collected samples was 0.48 dSm⁻¹. These soils were highly calcareous in nature with the mean value of collected samples was 12.09 g kg⁻¹ and low to medium in organic carbon with the mean value of collected samples was 0.55 percent.

The soils are categorized as low in Nitrogen and Phosphorus as well as high in potassium content with the mean values of collected samples was 155.67 kg ha⁻¹, 11.01 kg ha⁻¹, 591.34 kg ha⁻¹ respectively, in pomegranate orchard soils of Jalna district.

These soils were low to medium in available Fe and Zn content with the mean values of collected samples was 0.23 mg kg⁻¹, 0.77 mg kg⁻¹ respectively whereas, high in Mn and Cu content with the mean values of collected samples was 8.32 mg kg⁻¹, 12.54 mg kg⁻¹, respectively.

The leaf nitrogen and potassium found in pomegranate orchard were in higher amount with the mean values of collected samples was 2.27, 4.92 percent respectively. While, phosphorus was deficient amount with the mean values of collected

samples was 0.27 percent in pomegranate leaf. The micronutrients *viz.*, zinc, copper were found to be deficient amount with the mean values of collected samples was 15.26 , 19.68 mg kg⁻¹ in leaves of pomegranate while, leaf iron and manganese were sufficient amount with the mean values of collected samples was 211.82, 69.41 mg kg⁻¹ in pomegranate leaves.

Calcium carbonate present in soil is positively significant with the total Phosphorus present in leaves and available zinc present in soil is also positively correlated with total manganese present in leaves of Pomegranate.

Title	-	Characterization and classification of soils from college of agriculture badnapur
Researcher	-	Sawant, Raju Bhimrao
Research Guide	-	Hanwate, G.R.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science
Degree	-	M.Sc
Thesis No.	-	1763
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033559
Abstract	-	

The present investigation entitled “Characterization and Classification of soils from College of Agriculture, Badnapur” was undertaken during the year 2016-17 in order to know the morphological, physical and chemical features of soils and secondly to categorise the soil as per USDA system of classification.

College of Agriculture, Badnapur is situated at 19.50⁰ and 47.53⁰ Longitudes with an altitude of 52 meters. The total area of this College campus was 37.73 ha. and distributed under three main Block ‘B’ (13.23 ha), ‘C’ block (15.50 ha) and ‘F’ block (09.00 ha.). Four soils profiles were opened and forty surface soil samples were collected by using scientific method of soil collection from B, C and F block. The collected soil samples were air dried, ground and stored in polythene bags for chemical analysis. The profile study was undertaken as per procedure and proforma given by NBSS and LUP, Nagpur.

The results emerged out from profile study indicated that the soils from College of Agriculture, Badnapur was clay in texture, very deep (more than 120 cm) and very dark brown (10 YR 2/2) to light yellowish brown (10 YR 4/2) in colour. Structure varied from medium, moderate, granular to medium, moderate, angular blocky. Consistency varied from slightly hard to very hard in dry condition, friable to extremely firm in wet condition. The coarse fragment of the soil varied from 8.56 to 19.94 per cent. The bulk density of these soils varied from 1.19 to 1.42 Mg m⁻³. The porosity varied from 46.41 to 55.26 per cent. Taxonomically the soils from College of Agriculture, Badnapur are classified into order Vertisols. Further these soils were classified under the sub-order Usterts, great group Haplusterts, sub-group typic Haplusterts and family clay, montmorillonitic.

The soils of studied area are moderately alkaline in reaction with pH ranged from 7.20 to 8.40. The electrical conductivity within safe to normal limit and varied from 0.15 to 0.91 dSm⁻¹. The organic carbon content was varied from 0.40 to 0.56 per cent, while the free lime content was ranged from 4.5 to 16.3 per cent in various depths of profile. The available nitrogen content was low to medium in category and varied from 134.96 to 257.16 kg ha⁻¹. The available phosphorus content of these soils was medium to moderate in category and varied from 11.80 to 23.36 kg ha⁻¹. The data indicates that soil of studied area was medium to very high in available potassium content and varied from 188.94 to 600.23 kg ha⁻¹. The trend showed, all the available N, P, K content decreased with depth.

Study of surface soil sample showed that, The soils of studied area are moderately alkaline in reaction with pH ranged from 7.50 to 8.40 and electrical conductivity varied from 0.27 to 0.77 dsm⁻¹ and categories under safe to normal limit and all soil samples found under non – saline class. The bulk density of the surface soil samples varied from 1.15 to 1.44 Mg m⁻³ and porosity varied from 49.132 to 56.60 per cent. The soils of study area are clay in nature. The organic carbon content of studied soil were ranged from 0.07 to 0.97 per cent and free lime content of studied area was under low to moderate category and ranged from 3.42 to 12.51 per cent. The available nitrogen content was varied from 47.04 to 376.32 kg ha⁻¹ and comes under very low to medium category, while the available phosphorus content of these soils varied from 10.56 to 22.14 kg ha⁻¹ and fall under medium to moderate category. The available potassium content of these soils varied from 312 to 691 kg ha⁻¹ and very high in available potassium content. The DTPA extractable Cu, Fe, Mn and Zn content of these soil was varied from 1.27 to 3.12, 2.07 to 6.64, 4.09 to 12.46 and 0.43 to 2.11 mg kg⁻¹ respectively of surface soil samples.

Title	-	Studies on effect of potassium levels and foliar spray of micronutrients on growth, yield and nutrient uptake by green gram
Researcher	-	Tyngshain, Kharkongor
Research Guide	-	Dhamak, A.L.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	1781
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033627
Abstract	-	

A field experiment was conducted during *Kharif* season 2016-17 to study the effect of potassium levels and foliar spray of micronutrients on growth, yield and nutrient uptake by green gram at experimental farm, Department of Soil Science and Agricultural Chemistry, College of Agriculture, Vasantao Naik Marathwada Krishi Vidyapeeth, Parbhani. The experiment was laid out on Vertisols with eight treatments replicated three times in randomized block design. The treatment consists of T₁ - Absolute control, T₂ - Only RDF (25:50 kg N and P₂O₅ ha⁻¹), T₃ - RDF + 25 kg K₂O ha⁻¹, T₄ - RDF + 50 kg K₂O ha⁻¹, T₅ - RDF + 25 kg K₂O ha⁻¹ + Grade I micronutrient (soil application), T₆ - RDF + 50 kg K₂O ha⁻¹ + Grade I micronutrient (soil application), T₇ - RDF + 25 kg K₂O ha⁻¹ + Grade II (0.5 %) micronutrient (foliar spray), T₈ - RDF + 50 kg K₂O ha⁻¹ + Grade II (0.5 %) micronutrient (foliar spray). The growth and yield attributes like plant height, leaf area, number of nodules, fresh weight of nodules, total biomass production, number of pods, seed yield and dry matter yield were significantly improved by the application of potassium and micronutrient along with RDF. The seed protein content and test weight increased by application of potassium with either Grade I or Grade II micronutrient along with RDF. It was inferred from the results that application of 25 kg N, 50 kg P₂O₅, 25 kg or 50 kg K₂O ha⁻¹ + Grade I or Grade II micronutrient fertilizer found superior to only N and P application i.e. RDF (25:50 kg N and P₂O₅ ha⁻¹). The potash application shows synergistic effects on other nutrients (N, P, Fe, Zn, Cu, Mn) uptake. Soil fertility was significantly improved due to application of potassium and micronutrients along with RDF. Net return was obtained significantly higher with the application of RDF + 50 kg K₂O ha⁻¹ + Grade I micronutrient which was statistically at par with RDF + 50 kg K₂O ha⁻¹ + Grade II micronutrient.

Title	-	Potassium management through soil application and foliar sprays in red gram under vertisols
Researcher	-	Ajabe, Mahesh Appasaheb
Research Guide	-	Deshmukh, M.S.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	1787
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033669
Abstract	-	

A field experiment was planned and conducted during *Kharif* 2016-17 to evaluate the “Potassium management through soil application and foliar sprays in red gram under Vertisols”. The experiment was conducted at Departmental Research Farm of Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani. The experiment was laid out in Randomized Block Design with three replications. There were ten treatments comprising graded levels of potassium and micronutrient viz ; T₁ - Absolute control, T₂ - Only RDF (25:50 kg N and P₂O₅ ha⁻¹), T₃ - RDF + 25 kg K₂O ha⁻¹, T₄ - RDF + 50 kg K₂O ha⁻¹, T₅ - RDF + 25 kg K₂O ha⁻¹ + Grade I micronutrient (soil application), T₆ - RDF + 50 kg K₂O ha⁻¹ + Grade I micronutrient (soil application), T₇ - RDF + 25 kg K₂O ha⁻¹ + Grade II (0.5 %) micronutrient (foliar spray), T₈ - RDF + 50 kg K₂O ha⁻¹ + Grade II (0.5 %) micronutrient (foliar spray), T₉ - RDF + 25 kg K₂O ha⁻¹ + 2% KNO₃ (foliar spray), T₁₀ - RDF + 50 kg K₂O ha⁻¹ + 2% KNO₃ (foliar spray).

The results clearly indicated that various growth and yield parameters like plant height, number of branches, number of pods, grain yield and dry matter yield was increased due to application of potassium and micronutrient. The highest test weight and seed protein content was recorded by application of potassium with Grade I or Grade II micronutrient combination along with RDF. It was inferred from the results that application of 25 kg N, 50 kg P₂O₅, 25 kg or 50 kg K₂O ha⁻¹ + Grade I or Grade II micronutrient fertilizer found superior over only N and P application i.e. RDF (25:50 kg N and P₂O₅ ha⁻¹). The K application shows synergistic effects on other nutrients (N, P, Fe, Zn, Cu, Mn) uptake. Soil fertility was found to be improved due to application of potassium and micronutrients to pigeon pea. Thus, the maximum gross monetary returns, net monetary returns and monetary benefits was received in treatment T₆ - RDF + 50 kg K₂O ha⁻¹ + Grade I micronutrient (soil

application) with 1.82 B:C ratio. This findings has proved the balance nutrition is a need of nation.

Title	- Characterization, classification and evaluation of physiography of soils of zari-naam river watershed (part-3) of parbhani district by using gis, gps and remote sensing
Researcher	- Sutar, Nandkishor Saudagar
Research Guide	- Dhamak, A.L.
Department	- Soil Science and Agricultural Chemistry
Subject	- Soil Science and Agricultural Chemistry
Degree	- M.Sc
Thesis No.	- 1789
Krishikosh link	- http://krishikosh.egranth.ac.in/handle/1/5810033671
Abstract	-

The present investigation “Characterization, Classification and Evaluation of Physiography of Soils of Zari-Naam River Watershed (Part-3) of Parbhani District By Using GIS, GPS and Remote Sensing” was carried out during the year 2016-17. The total length of river is 4.2 km. 50 representative surface soil samples were collected from Part-3 watershed area of NAAM river by grid survey and using topographic map, remote sensing imagery and GPS locations. From these 50 soil samples were drawn to study the properties and nutrient status. Further, the three representative soil profiles were excavated on the basis of soil depth and behavior of cracks. The water samples were collected for determining water quality parameter and total water budget of NAAM river watershed was estimated for irrigation. The thematic maps of all important soil parameters were generated.

The results emerged out from the present investigation revealed that soils of NAAM river watershed (Part-3) are deep to very deep, clayey, dark gray to dark yellowish brown. Taxonomically these are Typic Haplustepts and Vertic Haplusterts. These soils are neutral to alkaline in nature, safe in total soluble salt concentration, highly calcareous nature and low in organic carbon content.

The soils showed variation in fertility status. In general majority of soil samples were categorized as low in N and P, high in potassium, deficient in sulphur, marginally sufficient in iron, sufficient in manganese, deficient in zinc and copper. Water collected from Zari-NAAM river watershed is safe for irrigation.

Zari-NAAM river watershed has 9 primary and 5 secondary drain lines. Out of 356.78 ha area of Zari-NAAM river (Part-3) 102.57, 253.49 ha and 0.72 ha area falls under 0 to 1, 1 to 3 and 3 to 6 per cent slope, respectively and water storage capacity of watershed is 131476.70 m³.

Title	-	Effect of graded levels of potassium on growth, yield and quality of black gram
Researcher	-	Chaudhar, Akshata Vinod
Research Guide	-	Mane, S.S.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	1798
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033685
Abstract	-	

A Field experiment was conducted in *kharif* season 2016-17 at experimental farm of Department of Soil Science and Agril. Chemistry, College of Agriculture, Badnapur using black gram as a test crop to study the effect of graded levels of potassium on growth, yield and quality of black gram. The experiment was laid out on Vertisols with six treatment combination, replicated four times in randomized block design. The treatment consists of T₁ Absolute control (No fertilizer application), T₂ RDF (25:50:00 N, P₂O₅ and K₂O ha⁻¹ kg ha⁻¹), T₃ (RDF + 15 kg K₂O ha⁻¹), T₄ (RDF + 30 kg K₂O ha⁻¹), T₅ (RDF + 45 kg K₂O ha⁻¹), T₆ (RDF+ 60 kg K₂O ha⁻¹). The results emerged out clearly indicated that various growth parameters like plant height, germination percentage, number of pods, dry matter and seed yield was increased due to application of potassium. It was inferred from the results that application of 25 kg N, 50 kg P₂O₅ and 30 kg K₂O per hectare found superior over only N and P application i.e. RDF (25:50:00 N, P₂O₅ and K₂O kg ha⁻¹). The K application showed synergistic effects on other nutrients (N, P, K) uptake. Soil fertility was also found to be improved due to application of potassium to black gram.

Title - **Response of potassium to soybean crop on farmers field in vertisol**
Researcher - Dashrathe, Santosh Panditrao
Research Guide - Shirale, S.T.
Department - Soil Science and Agricultural Chemistry
Subject - Soil Science and Agricultural Chemistry
Degree - M.Sc
Thesis No. - 17103
Krishikosh link - <http://krishikosh.egranth.ac.in/handle/1/5810033719>
Abstract -

A field experiment was planned and conducted during *Kharif* 2016-17 to evaluate the “Response of potassium to soybean crop on farmers field in Vertisol”. The experiment was conducted at the Nandgaon, Fulkalas, Bharswada and Narsapur villages District, Parbhani. The experiment was laid out in Randomized Block Design with four locations. There were five treatments comprising of K levels viz ; T₁-farmer practices, T₂-30:60:00 NPK kg ha⁻¹ + 25 kg ZnSO₄, T₃ -30:60:30 NPK kg ha⁻¹ + 25 kg ZnSO₄, T₄-30:60:45 NPK kg ha⁻¹+ 25 kg ZnSO₄, T₅- 30:60:60 NPK kg ha⁻¹ + 25 kg ZnSO₄.

The results indicated that, plant growth, nutrient uptake, different forms of potassium, quality parameters, grain and straw yield were improved with the treatments T₄-30:60:45 NPK kg ha⁻¹ + 25 kg ZnSO₄, T₅- 30:60:60 NPK kg ha⁻¹ + 25 kg ZnSO₄. The application of fertilizers based on Farmers practice showed decreasing trend in soybean yield. Soil fertility status (available N, P, K, S and Zn) micronutrients and plant were higher in the treatment receiving potassium. The total uptake of nutrients was significantly increased with graded levels of potassium T₅- 30:60:60 NPK kg ha⁻¹+ 25 kg ZnSO₄ and T₄-30:60:45 NPK kg ha⁻¹ + 25 kg ZnSO₄. The uptake of N, P, K, S and zinc were increased due to application of potassium and maximum uptake of these nutrients were noticed in the treatments receiving potassium. The plant nutrient concentration studied in the present investigation enhanced due to potassium application over farmer practices. These finding indicate requirement of potassium to soybean crop.

Title	-	Effect of sulphur oxidizing bacteria and sulphur levels on growth, yield and nutrient uptake by pigeon pea
Researcher	-	Gokhale, Harshvardhan Bhagwan
Research Guide	-	Syed, Ismail
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	17106
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033722
Abstract	-	

A field experiment was conducted during *Kharif* season 2016-17 to study the “Effect of sulphur oxidizing bacteria and sulphur levels on growth, yield and nutrient uptake by pigeon pea” at experimental farm, Department of Soil Science and Agricultural Chemistry, College of Agriculture, Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani. The experiment was conducted on Vertisols with twelve treatments replicated twice in factorial randomized block design. The treatment consisted of $ES_0 \times S_0$ (control), $ES_0 \times S_1$ (0 kg Elemental S $ha^{-1} \times Thiobacillus thiooxidans$), $ES_0 \times S_2$ (0 kg Elemental S $ha^{-1} \times Thiobacillus ferrooxidans$), $ES_1 \times S_0$ (20 kg Elemental S $ha^{-1} \times$ control), $ES_1 \times S_1$ (20 kg Elemental S $ha^{-1} \times Thiobacillus thiooxidans$), $ES_1 \times S_2$ (20 kg Elemental S $ha^{-1} \times Thiobacillus ferrooxidans$), $ES_2 \times S_0$ (30 kg Elemental S $ha^{-1} \times$ control), $ES_2 \times S_1$ (30 kg Elemental S $ha^{-1} \times Thiobacillus thiooxidans$), $ES_2 \times S_2$ (30 kg Elemental S $ha^{-1} \times Thiobacillus ferrooxidans$), $ES_3 \times S_0$ (40 kg Elemental S $ha^{-1} \times$ control), $ES_3 \times S_1$ (40 kg Elemental S $ha^{-1} \times Thiobacillus thiooxidans$) and $ES_3 \times S_2$ (40 kg Elemental S $ha^{-1} \times Thiobacillus ferrooxidans$). The results clearly indicated that various growth and yield parameters like plant height, number of leaves, number of pods, seed yield and dry matter yield were increased due to application of $ES_3 \times S_1$ (40 kg Elemental S $ha^{-1} \times Thiobacillus thiooxidans$). It was inferred from the results that application of 25 kg N, 50 kg P_2O_5 , 25 kg K_2O with the 40 kg Elemental S ha^{-1} along with *Thiobacillus thiooxidans* was found superior over $ES_0 \times S_0$ (control). The elemental sulphur application showed synergistic effects on other nutrients (N, P, K, S, Fe, Zn, Cu, Mn) availability, and uptake. Soil fertility was found to be improved due to application of 40 kg elemental sulphur and *Thiobacillus thiooxidans* to pigeon pea.

Title	-	Effect of graded levels of potassium on nutrient content yield and quality of safflower
Researcher	-	Gaikwad, Prashant Narayanrao
Research Guide	-	Indulkar, B.S.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	17114
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033804
Abstract	-	

A field experiment was conducted to study "Effect of graded levels of potassium on nutrient content, yield and quality of safflower (*Carthamus tinctorius* L.)". during *rabi* season in the year 2016–2017 at Departmental farm of Soil Science and Agricultural Chemistry, College of Agriculture, Latur. The experiment was laid out in randomized block design (RBD) with 5 treatment combination (five levels of potassium *viz.* 0, 60, 70, 80 and 90 kg ha⁻¹ along with three replication.

The results of field trail on differential response of graded levels of potassium showed beneficial effect on growth parameters, nutrient content, yield and quality of safflower. *viz.* N, P and K uptake significantly increased due to application (T₃) RDF + 70 kg K₂O ha⁻¹. followed by (T₂) RDF + 60 kg K₂O ha⁻¹. The growth parameter *viz.* Leaf area, total biomass, number of grains capitulum⁻¹ and test weight of safflower significantly improved due to application of potassium. further, yield contributing characters *viz.* grain yield and straw yield as well as quality parameters such as oil and protein of safflower were significantly increased with application of (T₃) RDF + 70 kg K₂O ha⁻¹ followed by (T₂) RDF + 60 kg K₂O ha⁻¹. However, increment of potassium (90 kg ha⁻¹) proves superior in some aspects over other treatment. *viz.* total biomass, available nutrients in soil after harvest. The magnitude response of safflower to graded levels of potassium was in the order 70 > 60 > 80 > 90 > 0 kg ha⁻¹ in terms of yield and quality of safflower.

thus it can be concluded that application of recommended dose of N, P and graded level of potassium (RDF + 70 kg K₂O ha⁻¹) was found to be beneficial in respect of nutrient content, uptake, grain and straw yield and quality of safflower grown on inceptisols.

Title	-	Characterization, classification and soil site suitability of custard apple growing soils of marathwada region, Maharashtra
Researcher	-	Rakesha, M.C
Research Guide	-	Vaidya, P.H.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	17116
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033806
Abstract	-	

The present investigation was carried on topic “Characterization, classification and soil site suitability of custard apple growing soils of Marathwada region, Maharashtra”. Marathwada region situated exactly between 17°-35’’ to 20°-40’’ N latitude and 74°-40’’ to 78°-15’’ E longitude having 300 to 900 MSL. Nine representative pedons from different physiographic unit of Marathwada region were characterized and classified. The twenty seven fruit sample of adjoining area of soil profiles was collected and analyzed for their various quality parameters.

Custard apple growing soils of Beed, Latur and Nanded district soils are reddish brown (5YR 4/4) to yellowish brown (10YR 5/4) in colour, very shallow to moderately deep, granular to sub angular blocky in structure, non sticky non plastic to slightly sticky slightly plastic consistency in wet condition and silty loamy to clay in texture. The bulk density of the studied soils varied from 1.34 to 1.96 Mg m⁻³. The plant available water capacity (PAWC) varied from 25.2 to 80.1 mm. The saturated hydraulic conductivity of soil varies from 2.67 to 28.8 cm hr⁻¹. The soils were slightly to moderately alkaline (7.02 to 8.04 pH) in nature, electrical conductivity of the soil is < 1.0 dSm⁻¹, organic carbon content very low to high (0.1 to 0.75 percent) and calcareous in nature (1.80 to 21.1 per cent). CEC varies from 23.3 to 54.32 cmol (P+) kg⁻¹. The calcium is the dominant cation in the exchange complex followed by magnesium, sodium and potassium. Taxonomically these soils were classified into Lithic Ustorthent and Typic Ustorthents. The soil fertility status was low to high. The soil fertility status is increased the yield of custard apple was increased.

The yield of the custard apple ranged between 4.28 to 15.2 t ha⁻¹ in the study area. The maximum yield was recorded in Lithic Ustorthent (Entisols). The yield of custard apple significantly negative correlation with PAWC and soil depth $r = -0.80$ and $r = -0.69$ respectively. This indicated that the PAWC and soil depth increases with decreases the yield of custard apple.

The TSS of custard apple in the study area varied from 20.4 to 24.0 Brix (mean), reducing sugar ranged between 11.1 to 13.6 per cent (mean) and which was significantly positive correlated with CaCO₃ content in soil $r = 0.82$ and $r = 0.80$ respectively, indicating fruit quality increases with content of CaCO₃ in soil.

According to FAO 1983, the soils of Lithic Ustorthent (P₁) were highly suitable (S1) and Typic Ustorthents (P₂, P₃, P₄, P₅, P₆, P₇, P₈ and P₉) were moderate (S2) to marginally (S3) suitable for custard apple. From above however, concluded that the Lithic Ustorthent (Entisol) soils were found to be highly suitable (S1) for custard apple cultivation followed by Typic Ustorthents (S2) in marathwada region of Maharashtra.

Title	-	Effect tank silt and fym application on soil quality and yield of soybean (glycine max l.) under inceptisol
Researcher	-	Patil, Pallavi Dattatraya
Research Guide	-	Vaidya, P.H.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	17119
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033814
Abstract	-	

The field experiment was conducted during *kharif* season 2016-17 at farm, Department of Soil Science and Agricultural Chemistry College of Agriculture, Latur which is exactly situated at 18°, 24' 90" N latitude and 76°, 36', 99" E longitude at an elevation 540 MSL. The experiment under soybean with various treatments T₁- Control, T₂- 100% RDF, T₃- Tank silt @15t/ha + RDF, T₄- Tank silt @ 10t/ha + RDF, T₅- Tank silt @5t/ha + RDF, T₆- Tank silt @ 10t/ha + FYM @ 2.5t/ha + RDF, T₇- Tank silt @ 5t/ha + FYM @ 2.5t/ha +RDF, T₈- Tank silt @15t/ha + FYM @ 2.5t/ha + RDF, T₉-FYM 5t/ha + RDF. The experiment was laid out in RBD design in all there were nine treatments and three replications.

The moisture content in the root zone (0-15) increased with increasing rate of tank silt application at fifteen days interval. The maximum soil moisture was found in treatment T₃- Tank silt @15 t ha⁻¹ + RDF. The bulk density and pH of soil decreased where as organic carbon content, NPK and DTPA extractable micronutrient was increased and found maximum in treatment T₇- Tank silt @ 5 t ha⁻¹ + FYM @ 2.5 t ha⁻¹ +RDF followed by T₆- Tank silt @ 10 t ha⁻¹ + FYM @ 2.5 t ha⁻¹ + RDF which was significantly superior over application of tank silt, FYM and RDF alone. Similar trend was observed in case of plant growth, yield and uptake of NPK in soybean. The maximum yield of soybean was noticed in treatment silt @ 5 t ha⁻¹ + FYM @ 2.5 t ha⁻¹ + RDF and minimum yield and uptake of NPK was noticed in control. However from above concluded that the application of tank silt @ 5 t ha⁻¹ + FYM @ 2.5 t ha⁻¹ + RDF (inorganic fertilizer) improved the soil fertility, plant growth, yield and uptake of soybean under Inceptisols.

Title	- Studies on application of different micronutrients on yield uptake and quality of sunflower (<i>Helianthus annuus</i> L.)
Researcher	- Kumbhar, Chetna Shankar
Research Guide	- Indulkar, B.S.
Department	- Soil Science and Agricultural Chemistry
Subject	- Soil Science and Agricultural Chemistry
Degree	- M.Sc
Thesis No.	- 17120
Krishikosh link	- http://krishikosh.egranth.ac.in/handle/1/5810033818
Abstract	-

A field experiment entitled “Studies on application of different micronutrients on yield, uptake and quality of sunflower (*Helianthus annuus* L.)” was carried out during the *Kharif* season 2016, at departmental farm of Soil Science and Agril Chemistry, College of Agriculture, Latur. The experiment was laid out in RBD with 8 treatment combination along with three replication.

The results of field trial on response of sunflower to application of micronutrients showed beneficial effect on growth, nutrient uptake, yield and quality of. The growth parameter *viz.* leaf area, chlorophyll content and number of filled seeds significantly improved due to application of three micronutrient combination along with RDF.

The nutrient availability and nutrient uptake was significantly affected with application of treatments. The availability and uptake of N, P, K, S, Zn, Fe and B was maximum with application of treatment RDF+20 kg ha¹ ZnSO₄+20 kg ha¹ EDTA FeSO₄+2 kg ha¹ Borax .Further yield contributing characters *viz.* seed and straw yield as well as quality parameters like test weight, protein and oil content of sunflower were significantly increased with the application of RDF+20 kg ha¹ ZnSO₄+20 kg ha¹ EDTA FeSO₄+2 kg ha¹ Borax.

Application of RDF+20 kg ha¹ ZnSO₄+20 kg ha¹ EDTA FeSO₄+2 kg ha¹ Borax was found to be superior for increase in grain and straw yield of sunflower also improved the quality of sunflower seed in terms of test weight, protein content, oil content and oil yield. Among the treatments, application of micronutrients combination along with RDF showed superiority over all the treatments for improving yield of sunflower grown on inceptisol.

Thus, it can be concluded that balanced fertilizer application of three micronutrients (Zn, Fe and B) along with RDF shows superiority in nutrient availability, yield and quality of

sunflower as compared to application of two combine (Zn + Fe, Zn+ B, Fe+ B) and single micronutrient along with RDF on inceptisol.

Title	- Studies on the changes on soil quality status of college of agriculture, Latur farm and preparation of soil site suitability map
Researcher	- Chadar, Baija Ramesh
Research Guide	- Vaidya, P.H.
Department	- Soil Science and Agricultural Chemistry
Subject	- Soil Science and Agricultural Chemistry
Degree	- M.Sc
Thesis No.	- 17121
Krishikosh link	- http://krishikosh.egranth.ac.in/handle/1/5810033831
Abstract	-

The present investigation entitled “Studies on the changes on Soil quality status of College of Agriculture, Latur farm and preparation of soil site suitability map”. The study area is located in Latur district, College of Agriculture, Latur situated at 18⁰ 25' 90” N latitude and 76⁰ 36' 99” E longitudes. It is four km away from Latur city on the way of Latur-Nanded road. Total geographical area of College of Agriculture, Latur is 65 ha, 73 R which is divided into five blocks viz., Block A, B, C, D, E. These blocks were surveyed and finalized the six soil profile and forty five surface soil samples (0-30cm). Horizon wise soil profile and surface soil samples and ground water samples were collected for laboratory analysis. The comparative study also carried out with the earlier results of Yadav (2005).

The soils of Farm, College of Agriculture, Latur were shallow to moderately deep, very dark gray (10 YR 3/1) to dark brown (10YR 3/3) in colour, granular to sub-angular blocky in structure, silty clay loam to clay in texture. The bulk density of soils varied from 1.24 to 1.79 Mg m⁻³. The Plant available water capacity of soils varied from 58.29 to 228.0 mm. The soils are slightly to moderately alkaline in reaction (7.6 to 8.51). The electrical conductivity of the soil is < 1.0 dSm⁻¹. The organic carbon content in soils is low to moderate and varied from 0.12 to 0.80 per cent. The calcium carbonate content varied from 7.5 to 45.6 per cent indicated that soils are calcareous in nature. The CEC of soil varied from 31.30 to 63.30 cmol(p⁺) kg⁻¹. Calcium is the dominant cation followed by magnesium, sodium and potassium in all profiles. The base saturation per cent varied from 93.47 to 98.89 per cent. The soils of the study area classified as Typic Ustorthents, Calcic Haplustepts, Vertic Haplustepts and Calcic Haplusterts, respectively. Soil fertility status was found low to high.

The comparative study with the result reported by Yadav (2005) indicated that NPK and DTPA extractable micronutrients Fe, Mn, Zn and Cu was found decreased with time due to continuous cropping and very little changes were observed among the other soil quality parameter.

The quality of ground water indicated that the water samples showed high salinity and low sodicity; hence these were classified as C₃S₁. Residual sodium carbonate in well and tube well water had less than 1.25 mmol⁻¹. This suggests that this water is suitable for irrigation.

Soil site suitability based on optimum yield basis the soils of Calcic Haplusterts were highly suitable (S1), Calcic Haplustepts and Vertic Haplustepts were moderately suitable (S2) and Typic Ustorthents marginally suitable (S3) for soybean crop. Whereas for pigeon pea Calcic Haplusterts are highly suitable (S1) Calcic Haplustepts and Vertic Haplustepts moderately suitable (S2) and Typic Ustorthents soils are marginally suitable (S3).

Title	- Studies on foliar nutrition in black gram [<i>Vigna mungo</i> (L.)] under rainfed condition.
Researcher	- Jadav, Shantanu Madhukar
Research Guide	- Takankhar, V.G.
Department	- Soil Science and Agricultural Chemistry
Subject	- Soil Science and Agricultural Chemistry
Degree	- M.Sc
Thesis No.	- 17123
Krishikosh link	- http://krishikosh.egranth.ac.in/handle/1/5810033838
Abstract	-

The field experiment was carried out on “Studies on foliar nutrition in black gram [*Vigna mungo* (L.)] under rainfed condition.” during *kharif* season of the year 2016-17 at the Research farm of College of Agriculture, Latur. The experiment was laid in randomized block design with three replications and variety TAU-1 as a test crop along with eight treatments *viz.*, T₁ - Control, T₂ - RDF + Water Spray, T₃ - RDF + 19:19:19 @ 1.0 % at vegetative stage, T₄ - RDF + 00:52:34 @ 1.0 % at flowering stage, T₅ - RDF + 13:00:45 @ 1.0 % at grain filling stage, T₆ - T₃ + T₄, T₇ - T₄ + T₅ and T₈ - T₃ + T₄ + T₅.

The results of field study indicated that, the growth, yield uptake and quality of black gram were significantly influenced by foliar nutrition. The growth parameters *viz.*, plant height, number of branches, number of leaves plant⁻¹, leaf area plant⁻¹, number of pod plant⁻¹ and dry matter of black gram were significantly improved due to treatment T₈ (RDF + 19:19:19 @ 1.0 % at vegetative stage, RDF + 00:52:34 @ 1.0 % at flowering stage and RDF + 13:00:45 @ 1.0 % at grain filling stage). Whereas, yield contributing characters *viz.*, seed yield, straw yield and biological yield as well as quality parameters such as protein content, protein yield and test weight of seed in black gram were also increased significantly with application of foliar nutrients as per treatment T₈ over rest of the treatments.

The uptake of nutrients *viz.*, N, P and K at successive stages of crop growth were significantly increased due to treatment T₈ (RDF + 19:19:19 @ 1.0 % at vegetative stage, RDF + 00:52:34 @ 1.0 % at flowering stage and RDF + 13:00:45 @ 1.0% at grain filling stage) over rest of the treatments followed by T₆ (RDF + 19:19:19 @ 1.0 % at vegetative stage + 00:52:34 @ 1.0 % at flowering stage). Minimum uptake was observed in control.

The physico-chemical properties of soil after harvest of black gram crop were found non-significant except organic carbon content and available potassium. The organic carbon in soil after harvest of black gram was significantly increased by application of foliar treatment T₈ (RDF + 19:19:19 @ 1.0 % at vegetative stage, RDF + 00:52:34 @ 1.0 % at flowering stage and RDF + 13:00:45 @ 1.0 % at grain filling stage) followed by T₆ (RDF + 19:19:19 @ 1.0 % at vegetative stage + 00:52:34 @ 1.0 % at flowering stage). The available K content in the soil was also influenced significantly due to foliar nutrient treatments.

Title	-	Effect of liquid bio-fertilizers (bradyrhizobium and psb) on growth and yield of green gram
Researcher	-	Chatarkar, Dhananjay Vitthalrao
Research Guide	-	Takankhar, V.G.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	17125
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033842
Abstract	-	

The field experiment was carried out on “Effect of liquid bio-fertilizers (*Bradyrhizobium* and PSB) on growth and yield of green gram” during *Kharif* season of the year 2016-17. It was conducted at the Research Farm of College of Agriculture, Latur, in randomized block design with four replications the variety BM-4 was used as a test crop along with 5 treatment of liquid bio-fertilizers (*Bradyrhizobium* and PSB).

The results of field experiment indicated that the growth parameters *viz.*, plant height, number of leaves, root length, number of nodules, dry matter and leaf area were significantly increased due to dual inoculation with 5 ml of *Bradyrhizobium* kg⁻¹ seed + 5 ml of PSB kg⁻¹ seed (T₅) treatment over rest of the treatments. Yield attributing characters *viz.*, number of pods, grain yield and straw yield of green gram were significantly increased due to seed inoculation with 5 ml of *Bradyrhizobium* kg⁻¹ seed + 5 ml of PSB kg⁻¹ seed (T₅) treatment over rest of the treatments. Quality parameters like protein content and protein yield were significantly improved due to dual inoculation with 5 ml of *Bradyrhizobium* kg⁻¹ seed + 5 ml of PSB kg⁻¹ seed (T₅) treatment over rest of the treatments.

Nutrient content and uptake *viz.*, N, P and K were significantly increased due to seed inoculation with 5 ml of *Bradyrhizobium* kg⁻¹ seed + 5 ml of PSB kg⁻¹ seed (T₅). Organic carbon and available N content in experimental soil was increased significantly due to seed inoculation with 5 ml *Bradyrhizobium* + 5 ml of PSB kg⁻¹ seed after harvest of greengram. The physicochemical properties *viz.*, pH, EC and CaCO₃ were not affected significantly due to seed inoculation with *Bradyrhizobium* and PSB.

Title	-	Studies on vermicomposting and composting of municipal solid waste (msw) and its effect on growth, yield and quality of chickpea
Researcher	-	Chetan Kumar, C
Research Guide	-	Vaidya, P.H.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	17126
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033868
Abstract	-	

The field experiment was conducted in *Rabi* season during the year 2016-17 on Vertic Haplustepts soils of Farm, department of Soil Science and Agricultural Chemistry, College of Agriculture, Latur. The experiment was laid out in Randomized Block Design with three replications and seven treatments *viz*, T₁ - RDF, T₂ - RDF + vermicompost of MSW @ 2.5 t ha⁻¹, T₃ - RDF + vermicompost of MSW @ 5 t ha⁻¹, T₄ - RDF + vermicompost of MSW @ 7.5 t ha⁻¹, T₅ - RDF + compost of MSW @ 2.5 t ha⁻¹, T₆ - compost of MSW @ 5 t ha⁻¹, T₇ - compost of MSW @ 7.5 t ha⁻¹.

The results revealed that the soil fertility, plant growth, yield attributes and quality of chickpea were significantly increased with increasing levels of MSW vermicompost and compost. The maximum nutrient status in soil and plant recorded in treatment T₄ - RDF + vermicompost of MSW @ 7.5 t ha⁻¹ followed by T₇ - RDF + compost of MSW @ 7.5 t ha⁻¹ which was significantly superior over control (RDF). Similar trend was observed in case of plant growth, yield and quality of chickpea. The content of DTPA extractable heavy metals increased with increasing levels of MSW compost and vermicompost. The maximum content of heavy metals was found in treatment T₇ - RDF + compost of MSW @ 7.5 t ha⁻¹ indicating compost of MSW having high amount of heavy metals as compared to vermicompost but it was found below permissible limits.

From above result it can be concluded that the application of MSW vermicompost and compost was found beneficial for improvement of soil quality, plant growth, yield and quality of chickpea. The vermicomposting and composting of MSW becomes an important tool for management of MSW in metropolitan cities.

Title	-	Characterization and classification of tank silt hybridized soils of Latur district
Researcher	-	Wande, Saurabh Samadhan
Research Guide	-	Vaidya, P.H.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	17130
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033872
Abstract	-	

The present investigation on “Characterization and classification of tank silt hybridized soils of Latur district.” The study was aimed at to characterization, classification of these soil and to evaluate the performance of soybean and pigeon pea under tank silt hybridized soils.

The study area is located exactly in between 17° 52’ to 18° 50’ N Latitude and 76° 18 to 79° 12’ E Longitude. The geographical area of the district is 7157 sq. kms. The climate of the area is hot, dry and sub-humid with annual rainfall is 794 mm. The mean maximum and minimum temperature of this district is 32.7 °C and 18.1 °C, respectively. The nine (09) soil profiles were studied on tank silt hybridized. The horizon wise soil sample was collected for analysis. The soil moisture content was recorded at flowering and harvest of soybean and pigeon pea. The yield data was recorded from adjoining area of soil profile.

The hybridized soils of the study area are very shallow to shallow in depth, very dark grayish brown (10 YR 3/2) to very pale brown (10YR 7/4) in colour, granular to angular blocky in structure, non sticky non plastic to very sticky, very plastic in nature, silty clay loam to clay in texture. The bulk density of these soils varies from 1.20 to 1.99 M gm⁻³. The moisture content and PAWC was increased with tank silt hybridization. The saturated hydraulic conductivity of tank silt hybridized soils varies from 2.70 to 27.10 cm hr⁻¹. These soils are slightly to moderately alkaline in reaction (6.70 to 8.45) and low in electrical conductivity (< 1.0 dSm⁻¹), calcareous in nature, low to medium organic carbon content (0.43 to 0.87 %). The cation exchange capacity of tank silt hybridized soil varied from 2.0 to 25.20 cmol(P⁺) kg⁻¹. The tank silt hybridized soil have Ca⁺⁺, Mg⁺⁺, Na⁺ and K⁺ varied from 10.28 to 33.83, 6.94 to 24.72, 0.36 to 2.54 and 0.18 to 1.61 cmol(p⁺) kg⁻¹ respectively and Ca is

dominant cation followed by Mg, Na and K . Base saturation of tank silt hybridized varies from 92.18 to 98.11 per cent.

According U.S. Comprehensive of soil classification (Soil Survey Staff, 1994 & 2015). These soils were classified as Typic Ustorthents and Lithic Ustorthants.

The fertility Status of these soils was low to high. The NPK status was increased with application of tank silt. The maximum yield of soybean was found with 27 cm depth of tank silt hybridized layer soil whereas and pigeon pea 45 cm depth of tank silt hybridized layer soil. The yield of soybean and pigeon pea was found positively correlated with Clay content ($r = 0.30$, $r = 0.42$), depth($r = 0.40$, $r = 0.69$) and PAWC ($r = 0.52$, $r = 0.71$). This indicated that tank silt hybridization increased the soil depth, clay content and PAWC of the soil which is increases the yield of crop. However, also concluded that shallower the depth of tank silt hybridized layer support to shallow rooted and short duration crop like soybean and deeper (> 45 cm) depth of tank silt hybridized layer support to deep rooted and long duration crop like pigeon pea.

Title	-	Effect of nutrient cum stress management and land management on soybean (<i>glycine max</i>) under rainfed condition
Researcher	-	Govari, P.B.
Research Guide	-	Gaikwad, G.K.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	17163
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034040
Abstract	-	

A field experiment was planned and conducted during *Rabi* 2015-16 to evaluate the “Effect of nutrient cum stress management and land management on soybean (*Glycine max*) under rainfed condition”. The experimental farm was located at AICRP on dry land Ariculture research station, Vasantao Naik Marathwada Krishi Vidyapeeth, Parbhani. The experiment was laid out in split plot design with three replications. There were three main treatment L₁(flat bed), L₂ (BBF), and L₃ (ridges and furrow) and eight sub treatment treatments *viz*; F₁ - RDF (30:60:30), F₂ - RDF + Foliar application of KNO₃ (35 and 60 DAS) @ 1 & 2 per cent F₃- RDF + Foliar application of NPK (19:19:19) (35 and 60 DAS) @ 0.5 per cent F₄ – RDF + Foliar application of MOP (35 and 60 DAS) @ 1and 2 per cent, F₅ – RDF + foliar application of Micro. Mix. (35 and 60 DAS) @ 0.5 per cent, F₆ - RDF + Straw mulch (35 and 60 DAS) @ 5t ha,⁻¹ F₇ - RDF+ Anti-transparent Kaolin (35 and 60 @ DAS) 7 per cent, F₈ – RDF + Water sprays (35 and 60 DAS).

The results indicated that, the land management treatment was found in plant height, leaf area and number of branches, yield attributing characters like total biomass production, grain yield and straw yield significant effect on treatment L₂ followed by treatment L₃ and L₁. The application of RDF + Foliar application of KNO₃ (35 and 60 DAS) @ 1 per cent & 2 per cent and F₃ - RDF+ Foliar application of NPK 19:19:19 (35 and 60 DAS) @ 0.5 per cent showed maximum uptake of major nutrient. The application of treatment F₂ showed improved growth, quality parameters and increased grain and straw yield. Soil fertility status (available N, P and K), micronutrients and plant nutrient concentration were higher in the treatments foliar application of KNO₃ supplementation. Available N, P and K status was decreased from flowering to harvest stage. In respect of micronutrients no specific trend was noted. The plant nutrient concentration studied in the present investigation was enhanced due to foliar

application of KNO_3 and NPK (19:19:19) over treatment F_7 , F_8 and F_1 . Thus, the maximum gross monetary return, net monetary returns and monetary benefits were observed in treatment receiving RDF + Foliar application of KNO_3 (35 and 65 DAS) @ 1 and 2 per cent with 2.03 B:C ratio. These findings indicates that, the effect of land management and requirement of foliar application of KNO_3 and N:P:K (19:19:19) to soybean.

Title	-	Effect of foliar application of Nutrients on yield, quality and uptake of Soybean (Glycine max (L) Merrill)
Researcher	-	Jadhav, U.B.
Research Guide	-	Indulkar, B.S.
Department	-	Soil Science and Agricultural Chemistry
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	17187
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034090
Abstract	-	

A field experiment was conducted at departmental farm of soil science and agricultural chemistry, college of agriculture, latur. VNMKV, Parbhani during *kharif* 2016–2017 using variety MAUS-81 of soybean was used for this experiment eight treatments containing two frequencies of sprays with different nutrients. The experiment was conducted in randomized block design with three replications.

The result of present investigation indicated that the growth ,availability of nutrients, yield and quality of soybean significantly influenced with application of RDF and two spraying of urea (30 and 45DAS) T6 followed by RDF and two spraying of KNO₃ (30 and 45 DAS) and RDF and two spraying of ZnSo₄ (30 and 45 DAS) over control and single spraying of these nutrients

The growth parameters viz plant height no of branches, no of nodules, no of pods, was found to be superior in treatment T6 as compared to T8. Spraying of nutrients helps to increase the availability of nutrients in soil the maximum availability of N, P, K, S and Zn was found in treatment T6 followed by T8 and T4 control Yield and quality of soybean significantly improves due to application of RDF along with two spraying of nutrients (T6) followed by T8 and T4 over control.

Thus it can be concluded that the application of RDF along with two foliar spray significantly improves growth, nutrient uptake yield and quality of soybean as compared to single foliar application of these nutrients in inceptisols.

Title	- Studies on effect of potassium and zinc solubilizing microorganism on mungbean
Researcher	- Navsare, Rahul Indar
Research Guide	- Mane, S.S.
Department	- Soil Science and Agricultural Chemistry
Subject	- Soil Science and Agricultural Chemistry
Degree	- M.Sc
Thesis No.	- 17198
Krishikosh link	- http://krishikosh.egranth.ac.in/handle/1/5810034128
Abstract	-

A Field experiment was conducted during *kharif* season 2016-17 at experimental farm of Department of Soil Science and Agril. Chemistry, College of Agriculture, Badnapur using green gram as a test crop to studies on effect of potassium and zinc solubilizing microorganism on mungbean. The experiment was laid out on Vertisols with five treatment combination, replicated four times in randomized block design. The treatment consists of T₁ Absolute control (No fertilizer application), T₂ RDF (25:50:00 N, P₂O₅ and K₂O kg ha⁻¹), T₃ (RDF + *Rhizobium* + PSB + KSB), T₄(RDF + *Rhizobium* + PSB + ZSB), T₅ (RDF + *Rhizobium* + PSB + KSB + ZSB). The results emerged out clearly indicated that various growth parameters like number of pods, number of nodules, total biomass production, dry matter and seed yield was increased due to application of potassium and zinc solubilizing microorganism. It was inferred from the results that application of RDF and zinc and potassium solublizing microorganism found superior over only N and P application i.e. RDF (25:50:00 N, P₂O₅ and K₂O kg ha⁻¹). The KSB and ZSB application showed synergistic effects on other nutrients (N, P, K) uptake. Soil fertility was also found to be improved due to application of ZSB and PSB to green gram.