1- INFLUENCE OF UREA FERTILIZER ON SOME SOIL MICROBIOLOGICAL AND BIOCHEMICAL PARAMETERS

A laboratory incubation study was conducted to estimate the influence of N-fertilizer (urea) on a paddy field soil health under controlled moisture (flooded soil) and temperature (25 oC) conditions. The fertilizer was applied at 0, 25, 50, 100, 200, and 400 g N g⁻¹ soil. The fertilizer concentrations ranging from 0 to 100 g N g⁻¹ soil showed a positive response on ETS activity. However, at concentrations of 200 and 400 g N g⁻¹, the activity was reduced significantly. The higher rates of fertilizer caused an improvement in the soil phenol contents and it increased with increasing concentration of fertilizer. The fertilizer incorporation didn’t produce any significant change in soil protein content while the response of biomass phospholipid content was nearly similar to ETS activity; it increased with lower rates of N-fertilizer but decreased at higher rates.

Keywords: Urea, ETS activity, phenol, protein, phospholipids, paddy soil

2- RESPONSE OF CINERARIA PLANT TO WATER STRESS AND COMPOST SOURCES UNDER Drip IRRIGATION SYSTEM

Cineraria (Senecio cruentus) are admired flowering potted plants due to their wide range of colors. It is considered as very sensitive to water stresses. Pot experiments under open field condition, were conducted during the two growing seasons 2004/2005 and 2005/2006 at the Experimental Station of Ornamental Plants, Fac. of Agric., Mansoura Univ., to investigate the effect of different irrigation water regimes and composts application as soil conditioners, prepared from rice straw, cotton and maize stalks, as well as their interactions on growth, flowering and chemical composition of cineraria plants. Crop-water requirements were based on Class-A pan evaporation, however, four irrigation treatments were tried: Ep 0.6, Ep 0.8, Ep 1.0 and Ep 1.2, which were equivalent to the applications of 60%, 80%, 100% and 120%, respectively, of the evaporated depth of water from Class-A pan.

Results indicated that although all the amount of irrigation water treatments improved the growth and chemical composition (Chlorophyll a and b mg/g f.w., nitrogen percentage and its uptake), irrigation application equal to 120% of Class A pan evaporation depth proved to be the most favorable as the maximum content of chlorophyll and nitrogen uptake were improved. Regarding soil conditioners, several characters were improved due to composts addition such as plant height, leaf area, both number of branches and flowers per plant as well as diameter of display (cm). In addition, results also, showed that the contents of chlorophyll a and b and nitrogen in leaves were significantly increased as a result of composts application. On the other hand, porosity and saturation percent values increased with the addition of soil conditioners, but bulk density take the opposite. For the best vegetative growth and flowering of cineraria plants, it may be recommended to be irrigated equal to 120% of Class A pan evaporation depth using maize compost as soil conditioner with a rate of 0.2 kg/pot.

3- EFFECT OF BIO AND CHEMICAL NITROGEN FERTILIZERS WITH FOLIAR OF HUMIC AND AMINO ACID ON WHEAT
Two field experiments were carried out at Manshaat Abdel-Rahman Dakahlia Governorate during winter seasons of 2004/2005 and 2005/2006 to study the effect of biofertilizer (Nitrobein), Chemical fertilizer as soluble (urea and ammonium nitrate) and slow release urea formaldehyde coated urea (UFCU) with foliar humic and amino acid on yield (grain and straw), uptake (N, P and K) and content of micronutrients (Fe, Zn, Mn and Cu) on wheat plants in clay soil. The experiment consists of 32 treatments which replicated 4 times. The experiment was factorial in complete randomized block design. The three studied effects of biofertilization, chemical N fertilizers (urea, AN and UFCU) and foliar of humic and amino acid as well as interaction between them exhibited a significantly positive effect and also:

- Inoculation of wheat grain by nitrobein as a biofertilizer under chemical N forms (Urea, AN and slow release UFCU) superposed chemical N fertilizers only.
- Used of slow release N fertilizer (UFCU) superiority chemical N fertilizer (urea and AN).
- The interactions of biofertilizer, chemical N and foliar humic and amino acids.

The study under the present conditions recommended nitrobein as biofertilization with slow release (UFCU) at rate 75 kg N/fed and foliar humic and amino acids, where it can give high production of grain yield of wheat and can lower environmental pollution.

Keywords: Urea formaldehyde coated urea, wheat, slow release, urea, ammonium nitrate, humic acid, amino acid.

4- EFFECT OF HUMIC ACID, EFFECTIVE MICROORGANISMS (EM) AND MAGNESIUM ON POTATOES IN CLAYEY SOIL

This investigation was carried out during the two fall seasons of 2004/2005 and 2005/2006 on potato cv. Spunta at Baramoon Experimental Farm, Dakahlia Governorate. The current study aimed to identify the integrated effect of humic acid, effective microorganisms (EM) and magnesium used as individual and/or combined treatments on vegetative growth, yield and its components and contents of NPK in leaves and tubers as well as dry matter and nitrate content in tubers.

Results showed that the vegetative growth parameters, i.e., plant height, number of main stems/plant, foliage fresh and dry weight/plant, at 75 days after planting, likewise, total yield, tuber number and tuber dry matter at harvest time, as well as NPK contents in the leaves at 75 days after planting and in tubers at harvest gave the highest values with the combined treatment which received humic acid, effective microorganisms (EM) and magnesium, while, the highest chlorophyll content at 75 days after planting was noticed with magnesium foliar spray. The lowest value of nitrate content in tubers was recorded from untreated plant.

The beneficial effect of humic acid combined with EM and magnesium, might be due to releasing the available nutrient and promoting the development of chlorophyll, and in turn reflected positively yield and its components.

5- INFLUENCE OF BIO, ORGANIC AND NATURAL ADDITIONS ON PLANT GROWTH, CHEMICAL COMPOSITION AND CHOCOLATE SPOT IN FABA BEAN

Laboratory and field experiments were conducted in 2006-2007 to study the effect of bio,
organic and natural additions on faba bean growth, chemical composition and chocolate spot disease. The laboratory results reveal that biozeid and bioaric completely inhibited the linear growth, fungal dry weight and sporulation as well as mycelial dry weight of botrytis fabae, but, plant oils â€¢ cumin, cornation, garlic and rocket oilsâ€¢ completely inhibited sporulation of Botrytis fabae.

The field experiment results show that the highest increase in fresh weight was recorded with bioaric, while in dry weight the highest increase recorded with rocket oil. Plant height, number of branches, pods/plant and seeds/pod all of these parameters were increased significantly with Acadian C. plant. Concerning to the weight of 100 grains gave the highest increase with aminogreen. It is clear from those results that there is highest increase in nitrogen and Mn with garlic oil, while rocket oil is most effect addition on concentration of P, K, Zn and Fe.

The results of this experiment show that bioaric led to maximum reduction of chocolate spot disease severity this followed by biozeid, while there is no significant difference between Acadian C. plant and aminogreen. In conclusion, bio, organic and natural additions were most effective addition in increasing growth, chemical composition and yield parameters of faba bean, and decrease the disease severity of chocolate spot in faba bean.

6- CHANGES OF SOIL PHYSICAL PROPERTIES AND MACRO NUTRIENT UPTAKE OF WHEAT IN DIFFERENT SOILS AS AFFECTED BY POLYMERS

A pot experiment was carried out to study the effect of three types of soil conditioners on the changes of soil properties and N, P, and K uptake of wheat in different soils. The tested polymers were: Aequa Kept â€¢ P1 â€¢, Super-Hydro â€¢ P2 â€¢, and Polyvinyllalkohol â€¢ P3 â€¢ these were tested at three levels 0.05% â€¢ L1 â€¢, 0.10% â€¢ L2 â€¢, and 0.15% â€¢ L3 â€¢ under three types of soils used (sandy, calcareous and alluvial soils).

Results obtained indicate that:
? The application of synthetic soil conditioners significantly decrease the bulk density after cultivation and increase the porosity, saturation percentage and organic matter content.
? The dry weights of plants are significantly increased with increasing the levels of application of polymers. The highest dry weights are recorded in different types of treated soils with the P2L3 treatment.
? N, P and K uptake are significantly increase with soil conditioners and their application rates.
? Results obtained indicate that both dry weight and N,P,K uptake in wheat plant increased by application of soil conditioners especially withâ€¢P2â€¢ at L3, following the order: Super-Hydro â€¢ P2 â€¢ > Aequa Kept â€¢ P1 â€¢ > Polyvinyllalkohol â€¢ P3 â€¢

7- EVALUATION OF TWO POLYMERS FOR THE IMPROVEMENT OF SOME SOIL PHYSICAL PROPERTIES IN SOME EGYPTIAN SOILS

Two soil conditioners were used in this investigation (Acqua-Kept (P1) and Super-Hydro (P2)) to evaluate their efficiency in improving some physical properties of some Egyptian soils (sandy, calcareous and alluvial). Both Acqua-Kept and Super-Hydro (P1 & P2) were
mixed with the air-dried soils at application rates of 0, 0.1 and 0.2 % (w/w).
The data obtained show that there are significant increases in bulk density, water stable aggregates, total aggregates, and mean weight diameter due to polymer application. On the other hand, the total porosity in all the studied soils tended to decrease compared to the control.

Soil conditioner application in sandy and calcareous soils caused an increase in soil penetration resistance but in the contrary the polymers addition to the alluvial soil caused a decrease in penetration resistance values.

Also the data revealed that the saturated hydraulic conductivity tended to decrease significantly due to polymers application to sandy, but the opposite trend was observed with calcareous and alluvial soils.

The results revealed that P1 (Acqua-Kept 0.2%) was more effective on sandy and calcareous soils. But P2 (Super-Hydro 0.2%) was the most effective polymer on the alluvial soil.

8-

**Microbial Response to Bensulfuron-Methyl Treatment in Soil**

A laboratory incubation study was conducted to evaluate the effect of bensulfuron-methyl treatment on soil microbial biomass and N-mineralization of a loamy sand soil. The herbicide was applied at 0 (control), 0.01 (field rate), 0.1, and 1.0 ?g g-1, and soil microbial biomass carbon (Cmb), soil microbial biomass nitrogen (Nmb), and N-mineralization rate (k) were measured at different times after herbicide treatment.

Compared to the untreated soil, Cmb and Nmb decreased significantly (p < 0.05) within the first 7 days after herbicide treatment at 0.1 and 1.0 ?g g-1, and the impact was greater for Nmb than for Cmb. Nitrogen mineralization was significantly suppressed during the first 5 days of incubation when the soil was treated with bensulfuron-methyl at 0.1 and 1.0 ?g g-1. The overall impact of bensulfuron-methyl to the soil microbial communities was closely related to the application rate in the range of 0.01?1.0 ?g g-1. This effect, however, was found to be transitory, and significant impact occurred only at high application rates.

9-

**EFFECT OF CHICKEN MANURE AND MANURE COMPOST TEA ON POTATO YIELD AND SOIL FERTILITY.**

To evaluate the effect of chicken compost and compost tea on vegetative growth, yield components and chemical composition of potato crop (Solanum tuberosum L.) cultivar Spunta grown on a clayey soil and then study the effect of aforementioned factors on soil quality during the successive season of 2004/2005 winter a field experiment was performed out in Monshat El-Badawi Village, Talkha District, Dakahlia Governorate (North Nile delta region). Five treatments were arranged in a complete randomize block with three replicates, Four application methods (ore compost, sediment, sediment and extract combination and compost tea). Compost tea, foliar significantly increased dry shoot yield and fresh tuber yield. Also, application of compost tea increased dry matter (as %), crud protein (as %) and specific gravity of tubers in both seasons. As so, sediment and extract combination addition increased dry matter (as %) in tubers, and crud protein (as %) significantly. The addition of chicken manure into the soil increased both of total and available nitrogen, phosphorus and potassium in the soil. In spite of the highest
values for all studied parameters under investigation were realized due to the compost tea treatment.

10- IMPACT OF FARMYARD MANURE AND MANURE COMPOST TEA ON POTATO YIELD AND SOIL FERTILITY.

A field experiment was conducted during the successive season of 2004/2005 winter in using clayey soil at Monshat El-Badawi Village, Talkha District, Dakahlia Governorate (North Nile delta region), to investigate the ability of applying farmyard compost and its compost tea on potato crop (Solanum tuberosum L.) cultivar Spunta and economic return for each treatments. Five treatments were arranged in a complete randomize block with three replicates, Four application methods (ore compost, sediment, sediment and extract combination and compost tea). Compost tea, foliar significantly increased dry shoot yield and fresh tuber yield in both seasons. Also, application of compost tea increased dry matter (as %), crud protein (as %) and specific gravity of tubers in both seasons. As so, sediment and extract combination addition increased dry matter (as %) in tubers, and crud protein (as %) significantly in both season. The addition of farmyard manure into the soil increased both of total and available nitrogen, phosphorus and potassium in the soil. In spite of the highest values for all studied parameters under investigation were realized due to the compost tea treatment.

11- IMPROVEMENT OF FODDER BEET PRODUCTIVITY AND QUALITY USING GYPSUM AND POTASSIUM FERTILIZER IN ALKALINE SALINE AFFECTED SOIL

Two field experiments were carried out at the Experimental Farm of El-Serw St., Damietta Governorate during 2006/2007 and 2007/2008 winter seasons on fodder beet (Beta vulgaris c.v. Vorochenger) to study the effect of gypsum and potassium fertilizers on yield and quality of fodder beet. The study included four gypsum levels i.e. zero (control), 5, 10 and 15 ton /fad. and four potassium fertilizer levels (zero (control), 36, 72 and 108 kg K2O/fad.). The experimental design was strip plot design with three replicates. Significant differences were recorded between different treatments and the treatment which received 15 tons gypsum/fad. and 108 kg K/fad. surpassed the other treatments in all the growth characters of fodder beet plants e.g. root length, root diameter, fresh and dry yield of roots and foliages. The same treatment was superior in quality characteristics, crude protein, ash and digestible crude protein but it gave the lowest value of crude fiber and total digestible nutrients. Meanwhile the same treatment was superior in nitrogen content but it gave the lowest values of phosphorus and potassium. It may be recommended that adding gypsium at a rate of 15 ton/fad and 108 kg K2O improved fodder beet productivity under alkaline saline affected soil.

12- EFFECT OF ORGANIC AND MINERAL NITROGEN FERTILIZERS ON POTATO CROP

A field experiment was conducted on alluvial soil at Dakahlia Governorate, Egypt during the growing season of 2007/2008 to study the effect of organic-N as rice straw compost
(three levels 0, 6 and 12 t fed-1), inorganic-N as ammonium nitrate (three rates 60, 120 and 180 kg N fed-1) and their interaction on potato (Solanum tuberosum, L) cultivar Spunta. Organic-N and mineral-N application significantly increased leaves No./plant, plant height and leaf area. While, the interaction effect between organic and mineral N was insignificantly on leaves No./plant and plant height and significantly on leaf area. Fresh tuber yield and dry shoot yield significantly increased with compost and mineral-N application and their interaction. The highest value of fresh tuber yield was 19, 28 t fed-1 with interaction of 180 kg N + 12 t fed-1 compost. Dry matter % in tubers was significantly affected by mineral-N, compost application and their interaction after 70, 90 and 110 days from planting. Protein percent and specific gravity were significantly affected with mineral-N fertilization, but insignificantly affected by compost application. N, P and K % in shoots and tubers dry matter were increased with mineral nitrogen and compost addition and their interaction as compared with control at different periods.

INTEGRATED IMPACTS OF BIO FERTIGATION AND HUMIC SUBSTANCES ON NUTRIENT CONTENTS OF COWPEA GROWN ON NEWLY RECLAIMED SOILS

Biofertilizer has been identified as an alternative to chemical fertilizer to increase soil fertility and crop production in sustainable farming. A bio fertigation trial was conducted at the Agricultural Research Station, National Research Centre, El-Nubaria district, Egypt during the summer season (May-August) of 2007 to study the relative efficacy of bio fertigation of liquid formulation of N-fixer (Azospirillum sp. and Azotobacter sp.) and P-solubilizer (Basillus megatherium) along with humic substances (HS) and inorganic fertilizers injected through drip irrigation system on soil properties and the growth of cowpea. These plants grown under four treatments; the basal control treatment represented the 100% recommended dose of NPK as drip fertigation, while 50% recommended dose of NPK as drip fertigation combined with bio fertigation of microbial inoculums and/or humic substances (HS) were injected through drip irrigation system. Results revealed that application of 50% recommended dose of NPK as drip fertigation jointly with bio fertigation and humic substances improved nutrient contents in soil (N, P, K, Fe, Mn and Zn), plant growth, nodule parameters, seed quality and fertilizer use efficiency (kg seed kg-1NPK) as well as nutritional assimilation of cowpea followed by 100% recommended dose of NPK, 50% recommended dose of NPK jointly with humic substances and then 50% recommended dose of NPK in combination with bio fertigation treatments. In spite of 100% recommended NPK drip fertigation improved cowpea yield solely, application of 50% recommended NPK dose in conjunction with bio fertigation and humic substances gave rather equal yield.

Lastly, The multiple linear regression equation illustrates that, the parameters of available soil-nutrients i.e. N, K, Fe and Mn except for Zn have a significant role in predicting biomass of cowpea yield, Biomass (Mg fed-1) = 1.86 + 0.0187 Fe ppm + 0.0220 Mn ppm + 0.0020 Znppm - 0.00156 Nppm - 0.00092 Pppm -0.000360 K ppm (r2 = 0.92)

Influence of micronutrients foliar application and nitrogen fertilization on wheat yield and quality of grain and seed.

The field experiment was conducted at Tag AL-Ezz, Agricultural Research Station Farm,
Dakahlia Governorate, Agricultural Research Center, Egypt (+7 m altitude, 31° 36' latitude and 30° 57' longitude), during 2005/2006 and 2006/2007 seasons to study the effect of foliar application with micronutrients (untreated {control}, spraying with water, Cu, Mn, Fe and Zn at the rate of 500 ppm of each as well as the mixture of these 4 micronutrients at the rate of 500 ppm of each) under nitrogen levels 50, 70 and 90 kg N/fed, as well as, their interactions on yield and its components, grains quality and chemical composition of wheat cultivar Giza 168. Also, a laboratory experiment was conducted at Seed Technology Research Unit at Mansoura, Dakahlia Governorate, Field Crop Research Institute, Agricultural Research Center, Egypt, to determine germination percentage and seedling vigor tests (seed quality) of the resultant seed from field experiment. Results indicated that foliar application of the micronutrients mixture at the rate of 500 ppm produced the highest values of grain yield and its components, chemical composition as well as quality parameters of both grains and seed with significant differences compared with other foliar application treatments in both seasons. The second best treatment was the application of Zn followed by Mn in both seasons. Cu and Fe treatments were similar in their effects and the difference between them were insignificant in most traits. The highest values of both straw and grain yields and yield components as well as quality parameters of grains and seed were resulted from increasing nitrogen levels up to 90 kg N/fed as compared with other levels (50 and 70 kg N/fed) in both seasons. The results under the present conditions of Tag El-Ezz show that foliar application with mixture of micronutrients in addition to fertilizing with 90 kg N/fed can be maximize wheat straw and grain yields and gave the best quality parameter of both grains and seed. Moreover, it can be recommended that spraying wheat plants with Cu or Mn or Fe or Zn or mixture (at the rate of 500 ppm) and adding 70 kg N/fed, which surpassed grain yield over untreated (control) + 90 kg N/fed.

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**Morpho-physiological and anatomical responses of wheat plants to micronutrients and nitrogen fertilization**

Two field experiments were conducted in 2005/2006 and 2006/2007 in the region of Tag AL-Ezz, Agricultural Research Station Farm, Dakahlia Governorate, Agricultural Research Center, Egypt to evaluate the effect of nitrogen rates and micronutrients fertilizers on wheat plant growth, some physiological and anatomical parameters and yield.

Application of micronutrients combined mixture under high nitrogen rate produced the highest values of plant growth, yield and physiological characteristics compared with other treatments. The second rank best treatment was observed with applications of Zn, then Mn treatment. Cu and Fe treatments were equal in its effect and the differences between them were insignificant in the most cases. Application of nitrogen rate up to 90 kg/fed increased gradually all studied characters. Anatomically, application of combined mixtures of micronutrients under high nitrogen rate increased significantly all anatomical characteristics of flag leaf or culm, in particular, number of vascular bundles and thickness of mechanical tissue in culm as well as dimension of vascular bundles, diameter of metaxylem vessels, and thickness of epidermis in both flag leaf and culm. Furthermore, thickness of mesophyll parenchyma and midrib region in flag leaf was also increased.

In conclusion, the obtained results show that foliar application of combined mixture of
studied micronutrients (Cu, Mn, Fe and Zn) at the rate of 500 ppm from each under moderate (recommended rate) or high rate of nitrogen fertilizer (70 or 90 kg N/fed) can be recommended to maximize wheat growth and grain yield per main spike and per plant.

**MAXIMIZING UTILIZATION OF COMPOST ADDITION USING FOLIAR COMPOST EXTRACT AND HUMIC SUBSTANCES IN ALLUVIAL SOIL**

Two field experiments were carried out in clay soil at the experimental farm of Gemmeiza Agriculture Research Station (Middle Delta, Egypt) during the two successive winter seasons of March 2007 and March 2008, to investigate the possibility of spraying compost extract and humic substances as foliar application for maximizing the soil compost addition. For that purpose, kidney bean (Phaseolus vulgaris, L.) was planted in two successive seasons. The compost was added to all treatments except the control (100% mineral nitrogen fertilizer). Both compost extract and humic substances were added each alone twice or alternatively. The results clearly showed a positive effect of compost extract and humic substances on all plant growth parameters. The superior treatment was when compost extract was sprayed alternatively with humic in present of 75% of mineral nitrogen fertilizer with 10 Ton/fed of compost as soil addition, the following treatment was spraying of compost extract alone with 75% of mineral nitrogen fertilizer plus (10 Ton/fed) of compost addition. Generally, results pointed that usage of compost extract and humic as foliar application maximized the utilization of soil compost addition.

**Chemically Modified Crop Residues as a Low-Cost Technique for the Removal of Heavy Metal Ions from Wastewater**

Batch adsorption experiments were carried out to evaluate the effect of type of crop residues and chemical pretreatment solutions on the removal efficiency of heavy metal ions at different concentrations of synthetic wastewater solutions. Rice straw, cotton stalks, and maize stalks were pretreated with different solutions (i.e., sulfuric acid, oxalic acid, sodium hydroxide, and distilled water as the control treatment) in order to increase their metal-binding capacity. Results indicated that cotton stalks were the best biosorbent material according to their efficiency in removal of heavy metal ions. Sodium hydroxide was the best chemical pretreatment method for stimulating the biosorption capacity of crop residues. Ions of Pb²⁺ had the highest biosorption ratio among all competitive ions, whereas Mn²⁺ ions had the lowest. The removal efficiency decreased as the concentration of heavy metal ions increased in aqueous solutions. Sorption equilibrium isotherms could be described by the Langmuir model in most cases, whereas an isotherm of S shape was observed.

**SOIL FERTILITY AND POTATO PRODUCTION AS AFFECTED BY CONVENTIONAL AND ORGANIC FARMING SYSTEMS**

A field experiment was conducted during the winter season of 2007/2008 at the Experimental Station of the Faculty of Agriculture, Mansoura University, Egypt, to evaluate the ability of water and ethanol-alcohol for extracting the nutrients from mature farmyard manure. In addition to assessing the effect of mature (FYM), sediments
(separated from extract), and both foliar application of extracts of farmyard manure (as organic farming technique) and mineral fertilizer treatment (as conventional cultivation system) on the quality and yield of potato (Solanum tuberosum, L.) and soil health (physical, chemical and biological properties) after harvesting stage. Nine treatments were arranged in a complete randomized block design with four replicates, (mineral NPK, mature FYM, watery FYM extract, watery sediment, watery FYM extract with sediment, ethanolic FYM extract, ethanolic sediment, ethanolic FYM extract with sediment, and control treatment). FYM extracts were sprayed on plant foliage, while others were added as soil application. The soil application of mineral fertilizer (as conventional system) has the highest significant values for all vegetative growth parameters, yield, yield components, of potato comparing with other organic treatments. In contrary, the soil application of FYM achieved the highest values for improving soil health after harvesting stage (including soil physical, chemical and biological, properties), also reducing the accumulation of NO3- and NO2- contents in potato tuber. FYM application methods (as organic system) enhanced all studied potato vegetative growth parameters, quality and quantity of the yield and also improve soil health, compared to the untreated treatment. For all potato plant growth parameters, FYM application methods can be arranged in the order: spraying of ethanolic FYM extract with its sediment> spraying of watery FYM extract with its sediment> spraying ethanolic FYM extract> spraying watery FYM extract> mature FYM> watery sediment> ethanolic sediment. While, for improving soil health parameters the soil application of mature FYM gave the highest values followed by spraying of watery FYM extract with its sediment> ethanolic FYM extract with its sediment> watery sediment> ethanolic sediment. Furthermore, it was observed that ethanol as extractor was more effective than water and consequently spraying ethanolic FYM extract with its sediment or alone achieved higher values for all potato growth parameters compared to spraying of watery FYM extract either with or without its sediment.

**EFFECT OF NITROGEN FERTILIZER RATES, TIMING AND SPLITTING APPLICATION ON WHEAT PLANT GROWN ON RECLAIMED SOILS**

Two field experiments were conducted in a private farm at El-Salhiea City; Sharkia Governorate during two winter seasons of 2006/2007 and 2007/2008 to investigate the effect of nitrogen fertilizer rates, timing and splitting application on wheat plant (triticum aestivum L.) on reclaimed soils. Ten treatments were arranged in a split plot design with three replicates; which were the simple possible combination between five treatments of N-fertilization, (30, 60, 90, 120 and 150 kg N fed-1) and two splitting doses of each N rates (1st splitting was divided to two equal doses 50 and 50% after 14 and 48 DAS and 2nd splitting was divided to four doses 40, 20, 20 and 20% after 14, 28, 48, 56 DAS). The wheat plant growth progressively increased with increasing the nitrogen fertilizer rates and the superiority of plant height, chlorophyll and spike length observed with 120 kg N fed-1 rather with N fertilizer splitting to 2 or 4 doses. The higher number of grains/spike observed with N fertilizer treatment at rate of 120 kg N fed-1 splitting to 4 doses. 1000 grain weight, straw and grain yield increased with increasing the rate of N fertilizer up to 120 kg N fed-1. Treatment 120 kg N fed-1 in four doses as 40, 20, 20 and 20% after 14, 28, 48, and 56 DAS, recorded higher values of 1000 grain weight, straw and grain yield of wheat. Significant difference in N, P and K concentration in boating and harvest stages
in straw and in wheat grain were observed due to different levels, splitting and time of N application. In general, N, P and K% were increased with increasing the N fertilizers levels up to 120 kg N fed-1 with split to 2 doses, and 150 kg N fed-1 with split to 4 doses. Under the same conditions of the experiment, it can be recommended to add the nitrogen fertilizer at 120 kg N fed-1 in four doses as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS, which gave the best result of quantity and quality of the wheat cultivated on sandy clay loam reclaimed soil.

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MAXIMIZING USE EFFICIENCY OF MINERAL N-FERTILIZATION FOR SPINACH AND ROCKET PLANTS

Two field experiments were conducted at the experimental farm of Faculty of Agricultural., Mansoura Univ. during the successive winter seasons of 2009-2010 and 2010-2011 to investigate some of the available options to reduce the losses and increase the efficiency of N-fertilization for Spinach (Spinacia Oleracea) and Rocket (Eurco Visicaria L.) plants. Thirty treatments were arranged in split-split block design, which were the simple possible combination between five treatments of mineral N, i.e ammonium nitrate (AN), AN+inhibitor (DCD), Urea (U), U+DCD and calcium nitrate (Ca-N) as a control treatment at the rate of 60 kgN/fad were arranged in the main plots. Treatments of N-fertilization were divided into 2, 3 or 4 doses and adapted as sub-plots. Two methods of N-applied were allocated as sub-sub plots, once as side dressing (SD) and the other as deep placement (DP). The results of these investigation indicated that; the highest safe yield of spinach and rocket plants and the most suitable treatment for realizing the highest use efficiency can be obtained due to applying N-fertilizer in the form of urea plus nitrification inhibitor (DCD) as deep placement in four doses. The obtained data, also revealed that under any form of N-fertilization the contents of nitrate in the leaves of spinach and rocket plants in the absence of (DCD) were higher than that obtained in the presence of (DCD) as a nitrification inhibitor. The study highlighted that; the heighest NUE values were recorded for the plants fertilized with U+DCD and splitting N-fertilizer to four doses and applied using deep placement method for realizing the highest safe yield for spinach and rocket plants.

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Chemically Modified Crop Residues as a Low-Cost Technique for the Removal of Heavy Metal Ions from Wastewater

Batch adsorption experiments were carried out to evaluate the effect of type of crop residues and chemical pretreatment solutions on the removal efficiency of heavy metal ions at different concentrations of synthetic wastewater solutions. Rice straw, cotton stalks, and maize stalks were pretreated with different solutions (i.e., sulfuric acid, oxalic acid, sodium hydroxide, and distilled water as the control treatment) in order to increase their metal-binding capacity. Results indicated that cotton stalks were the best biosorbent material according to their efficiency in removal of heavy metal ions. Sodium hydroxide was the best chemical pretreatment method for stimulating the biosorption capacity of crop residues. Ions of Pb2+ had the highest biosorption ratio among all competitive ions, whereas Mn2+ ions had the lowest. The removal efficiency decreased as the concentration of heavy metal ions increased in aqueous solutions. Sorption equilibrium
isotherms could be described by the Langmuir model in most cases, whereas an isotherm of S shape was observed in other cases, which did not follow the Langmuir isotherm model. In conclusion, cotton stalks pretreated with sodium hydroxide could be used as an efficient technique for wastewater remediation prior to irrigation due to its low-cost, little processing, and high biosorption capacity.

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SPATIAL DISTRIBUTION OF SOME SOIL PHYSICOCHEMICAL PROPERTIES IN KALABSHOW FARM USING GEOSTATISTICS

Geostatistics provides valuable tools to characterize the spatial distribution of soil properties. Kriging techniques rely on the spatial dependence between observations to predict attribute values at un-sampled locations. These techniques were used to study the spatial distribution of some soil physiochemical properties at the experimental farm of Mansoura University, Kalapshow, Bilqas District, Dakahlia Governorate, Egypt. Ordinary Kriging (OK) was used to surface interpolate soil clay, available water, EC, bulk density, soil organic matter (SOM), soluble K, exchangeable K and available K. Soil clay in the studied area varied from 1.23 to 9.17%. These values were associated with the conventional management practices of adding clay to these sandy textured soils. Available water was very low and varied from 6.49 to 9.87%. This is expected due to the relatively low clay content, and consequently low water holding capacity. Soils in the studied were non-saline, where EC values ranged between 1.09 and 3.09 dSm-1. Bulk density values ranged from 1.33 to 1.54. The pH values ranged from 8.03 to 8.19 in saturation soil paste. SOM was low and ranged between 0.35 and 0.96%. Soluble K varied from 0.12 to 0.26 meq.L-1, whereas exchangeable k varied from 0.12 to 0.55 Cmol.kg-1. Studied soils ranged between low (52 ppm) and moderate (178 ppm) in available K. Clay content had highly significant correlations (p=0.001) with exchangeable k, available k, available water, and SOM (r= 0.93, 0.91, 0.81, and 0.55, respectively). It could be concluded from the spatial distribution of these physiochemical properties that higher values of available water, EC, SOM, and the three forms of soil k were highly associated with those areas that have high contents of clay, whereas lower values were related to areas higher in sand.