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ATTEMPTS FOR REDUCING NITRITE POLLUTION IN WHEAT CV. SIDS-١٢ BY USING SOME ORGANIC MANURES ENRICHED WITH EFFECTIVE MICROORGANISMM (EM)

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ABSTRACT

During ٢٠١٠/ ٢٠١١ and ٢٠١١/ ٢٠١٢ seasons wheat cv. Sids-١٢ plants were fertilized with N (٧٥ kg N/ fed.) either through ١٠٠ % inorganic N or replacing ٢٥ to ٧٥ % of the mineral N by using organic N as compost, filter mud or poultry manure enriched with EM.

The obtained results emphasized the beneficial effects of using inorganic N at ٥٠ % of the suitable N plus any one of the three organic manures enriched with EM at ٥٠ % on growth and productivity of wheat Sids- ١٢ in comparison to using N completely via inorganic N. Using mineral N at percentage lower than ٥٠ % of N even with the application of organic and biofertilization caused a negative effects on growth and production of wheat. The best organic material applied with mineral N source was poultry manures, followed by compost while filter mud occupied the last position in this respect. Nitrite content in the seeds was greatly declined with decreasing mineral nutrition of N and enhancing organic fertilization enriched with various microorganisms (EM).

Supplying wheat cv. Sids- ١٢ plants with N (٧٥ kg./ fed./ year) at ٥٠ % mineral N plus ٥٠ % poultry manure enriched with EM contributed promoting productivity and reducing nitrite pollution in the seeds.

INTRODUCTION

Common wheat or bread wheat (*Triticum aestivum)* is a cereal belonging to family Poaceae. In ٢٠١٠ world cultivated area reached ٢٤٠ million ha (FAO, ٢٠١١). World production of wheat was ٦١٥ million tons, making it the third most produced cereal after maize (٨٤٤ million tons) and rice (٦٧٢ million tons) (FAO, ٢٠١١). Cultivated area in Egypt reached ٣.١ million feddans. Grains are grown on more land area then, any other commercial crop and is the most important staple food for humans. World trade in wheat is greater than for all other crops combined. Globally, wheat are the leading source of plant proteins in human food, having a higher protein content than either maize or rice, the other major cereals. Wheat grain is a staple food used to make flour for leaven, flat and steamed breads, biscuits, cookies, cakes, breakfast cereal, pasta noodles, coucous and for fermentation to make bio fuel. Wheat is planted to limited extent as a forage crop for livestock and its straw can be used as a construction material for roofing thatch. The whole green can be milled to leave just the endosperm for white flour. The by-products of this are bran and germ. The whole is concentrated source of vitamins, minerals and proteins, while the refined grain is mostly starch (Gooding and Davies, ١٩٩٧) (The wheat in Wikipedia, ٢٠١٢).

Intensive production of food crops that meet the growing demand for food in the world required increasing amounts of chemical fertilizers. However, the indiscriminate use of such agrochemicals negatively affected soil fertility and productivity in addition to plants lodging and environmental pollution. Prior to the introduction of chemical fertilizers, agricultural production was depended on the use of organic amendments to maintain soil fertility and productivity for more sustainable agriculture. Therefore, organic farming has emerged as an important system that relies on ecosystem management rather than external agricultural inputs (Samman *et al*., ٢٠٠٨) and as a partial area in view of the growing demand for safe and healthy food and long term sustainability (Karmakar *et al*., ٢٠٠٧).

Attempts for reducing nitrite pollution in wheat cv. sids-١٢ by using some organic

Application of biofertilizers is highly considered to limit the use of mineral fertilizers and decreasing agricultural costs, maximizing crop yield by providing the available nutritive elements and growth promoting substances (Metin *et al.*, ٢٠١٠). One of the environmentally sound approaches for nutrient management and ecosystem function is the use of soil microorganisms. It can either fix atmospheric N, solubilize P, synthesis of growth promoting substances and by enhancing the decompositions of plant residues to release vital nutrients and increase humic content of solids (Wu *et al.*, ٢٠٠٥). Using microorganisms had positive action on growth and yield of wheat (Mohamed *et al.*, ٢٠١٠). Effective microorganisms (EM) consist of mixed cultures of beneficial and naturally occurring microorganisms including lactic acid bacteria, photosynthetic bacteria, yeasts and actinomycetes and another microorganisms. It is responsible for increasing the microbial diversity of soils and plants, improving soil fertility and enhancing growth and production of field crops (Higa and Parr, ١٩٩٤).

Previous studies confirmed the essential of using N through mineral N as well as organic and biofertilization on growth, nutritional status, yield and yield components of different cereal crops (Angus *et al.*, ١٩٩٨; Ahmad, ٢٠٠٠; Ali, ٢٠٠٠; Idris and Wisal, ٢٠٠١; Singh and Agarwal, ٢٠٠١; Zeidan and Kramany, ٢٠٠١; Iqbal *et al.*, ٢٠٠٢; Yaduvanshi, ٢٠٠٣; Alam *et al.*, ٢٠٠٣; Abad *et al.*, ٢٠٠٤; Alam *et al.*,٢٠٠٥; Wu *et al.*, ٢٠٠٥; Shoman *et al.*, ٢٠٠٦; Abdel-Ati, ٢٠٠٦; Arif *et al.*, ٢٠٠٦; Martin, ٢٠٠٦; Parvez *et al.*, ٢٠٠٩; Bahrani and Hagh, ٢٠١٠; Abdelgadir *et al.*, ٢٠١٠; Javaid and Shah, ٢٠١٠; Mohamed *et al.*, ٢٠١٠; Ahmed *et al.*, ٢٠١١ and Alam *et al.*, ٢٠١٢).

The present study was conducted for two aims, the first was elucidating the effect of inorganic N along with various organic manures enriched with EM on growth and productivity of wheat cv. Sids- ١٢. While the second one was selecting the best N management for such wheat cv.

MATERIALS AND METHODS

Two field experiments were carried out in clay soil during the two winter seasons of ٢٠١٠/ ٢٠١١ and ٢٠١١/ ٢٠١٢ on wheat cv. Sids-١٢ in a private farm located at El Kawamel village, Souhag district, Souhag Governorate. Soil sample used for the experimental site was taken to determine mechanical analysis and some physico- chemical properties according to Chapmann and Pratt, (١٩٦٥) (Table ١). The tested soil was prepared by ploughing, harrowing and then leveling. It was divided into plots (٣ × ٣.٥ m٢) each. Grains were drilled at the last week of November in rows (١٥ cm. apart and the distance between plants within each row was ٥ cm.). Seeding rate was ٦٠ kg/ feddan.

Table ١: Analysis of the tested soil:

Constituents	Values
Sand %	: ٤.٥
Silt %	: ٢٥.٥
Clay %	: ٧٠.٠
Texture	: Clay
pH (١:٢.٥ extract)	: ٧.٥٥
E.C (١: ٢.٥ extract as mmhos/ ١ cm ٢٥° C)	: ٠.٩٦
O.M. %	: ١.٨٠
CaCO٣ %	: ٢.٢٠
Total N %	: ٠.٠٩
Available K (ammonium acetate, ppm)	: ٤٠٠
Available P (Olsen method, ppm)	: ٤.٢

The present experiment included the following ten treatments from inorganic and compost enriched with some organic manures:-

١. Application of the suitable N (٧٥ kg N/ fed.) completely via inorganic form (٣٦٤ kg ammonium sulphate/ fed., ٢٠.٦ % N).
٢. Application of ٧٥ % of the suitable N via inorganic form (٢٧٣ kg ammonium sulphate/ fed.) + ٢٥ % compost enriched with EM (effective microorganisms) (٩٣٨ kg/ fed.).
٣. Application of ٧٥ % of N via inorganic N form (٢٧٣ kg. ammonium sulphate/ fed.) + ٢٥ % filter mud (٨٣٣ kg./ fed.) enriched with EM.
٤. Application of ٧٥ % of N via inorganic N + ٢٥ % poultry manure enriched with EM (٧٥٠ kg./ fed.).

٥. Application of ٥٠ % of N via inorganic form (١٨٢ kg. ammonium sulphate/ fed.) + ٥٠ % compost enriched with EM (١٨٧٥ kg./ fed.).
٦. Application of ٥٠ % of N via inorganic form + ٥٠ % filter mud enriched with EM (١٦٦٧ kg./ fed.).
٧. Application of ٥٠ % of N via inorganic form + ٥٠ % poultry manure enriched with EM (١٥٠٠ kg./ fed.).
٨. Application of ٢٥ % of N via inorganic form (٩١ kg. ammonium sulphate/ fed.) + ٧٥ % compost enriched with EM (٢٨١٣ kg./ fed.).
٩. Application of ٢٥ % of N via inorganic form + ٧٥ % filter mud enriched with EM (٢٥٠٠ kg./ fed.).
١٠. Application of ٢٥ % of N via inorganic form + ٧٥ % poultry manure enriched with EM (٢٢٥٠ kg./ fed.).

Each treatment was replicated four times, one plot (١٠.٥ $m^٢$) per each. The experiment was arranged in a randomized complete block design (RCBD) with four replicates. Nitrogen was added at fixed rate (٧٥ kg. N/ fed.) according to Salah, (٢٠٠٦). The three organic manures used were plant compost (٢.٠ % N, ٠.٤٤ % $P_٢O_٥$ and ٠.٤٠ % $K_٢O$); filter mud (٢.٢٥ % N, ٠.٥٠ % $P_٢O_٥$ and ٠.٢٥ % $K_٢O$) and poultry manures (٢.٥ % N, ١.٢٧ % $P_٢O_٥$ and ١.٧٥ % $K_٢O$).

Filter mud organic fertilizer (by-product of sugar industrial) was obtained from Gerga sugar factory.

$EM_١$ (effective microorganisms) contains more than ٦٠ strains of microorganisms specially photosynthetic bacteria, *Rhadopseudomonass plustris, Rhadobacterphaerods lactic acid bacteria, Lactobacillus planteru, Lactobacillus case, Streptococcus lactis,* yeast namely *Saccharomyces cerevisiae* and others like microhiza (Higa and Parr, ١٩٩٤)

EM was added to all organic manures at a rate of ١٠ ml/ ١ kg. organic manure. The three organic manures (compost, filter mud and poultry manure) were applied once at sowing time and the mineral N source namely ammonium sulphate (٢٠.٦ % N) was applied at three unequal splits i.e. sowing, tillering and booting stages of wheat. Another P and K fertilizers were added at the recommended rate namely ١٥٠ kg. mono superphosphate (١٥.٥ % $P_٢O_٥$)/ fed./ year) and ١٥٠ kg. potassium sulphate (٤٨ % $K_٢O$)/ fed./ year. All other cultural practices i.e. weeding, hoeing, irrigation as when required was adopted uniformly.

After heading stage, plant height (cm.) was recorded on the treated plants.

Flag leaves were collected at two weeks after heading stage. Grains were taken after harvest for determining the plant pigments namely chlorophylls a & b and total carotenoids according to Moran, (١٩٨٢). Total chlorophylls was estimated (as mg/ ١.٠ g fresh weight), N %, P %, K % and Mg % in the leaves as well as Ca, P and K (as mg/ ١٠٠ g seeds) in the seeds according to the methods that outlined by Chapmann and Pratt, (١٩٦٥) and A.O.A.C., (١٩٩٥).

After harvesting (١st week of April during both seasons), spike length (cm.); number of grains per spike, ١٠٠٠ seed weight (g.), number of grains per plant, grain yield/ plant (g.), straw yield/ plant (g.) and per feddan (tons), grain yield/ fed (tons), yield biomass/ fed (tons), proteins %, fats % and nitrite in the seeds (as ppm) were determined according to Ridnour- Lisa *et al*., (٢٠٠٠).

Statistical analysis was done according to methods of Mead et al., (١٩٩٣) using new L.S.D at ٠.٠٥ % to compare between treatment means.

RESULTS AND DISCUSSION

١- Plant height:

It is clear from the data in Table (٢) that supplying wheat plant with N through ٥٠ to ٧٥ % inorganic N plus ٢٥ to ٥٠ % of any one of three organic manures enriched with EM significantly stimulated plant height in comparison to using N via inorganic N alone. Application inorganic N source at ٢٥ % even with organic manure enriched with EM gave low results. The promotion was associated with reducing inorganic N percentages from ١٠٠ to ٥٠ % and at the same time increasing percentages of enriched organic manures from ٠.٠ to ٥٠ %. The best organic manure in this respect was poultry manure enriched with EM, followed by compost, while filter mud occupied the last position in this respect. A significant reduction on plant height was observed with reducing inorganic N from ٥٠ to ٢٥ % even with the application of any one of the organic manures enriched with EM in comparison to using inorganic N at ١٠٠ % or when N was added via ٥٠ to ٧٥ % inorganic plus ٢٥ to ٥٠ % organic manures enriched with EM. Fertilizing wheat plants with the suitable N via ٥٠ % inorganic plus ٥٠ % poultry manure enriched with EM gave the highest values. The lowest values were recorded when the suitable N was applied via ٢٥ % inorganic + ٧٥ % filter mud enriched with EM. Similar results were obtained during both seasons.

The beneficial effect of organic and biofertilization on enhancing the biological, physical and chemical characters of soil as well as increasing organic, antibiotics and nitrogen fixation could explain the present results (Samman *et al.,* ٢٠٠٨ and Metin *et al*., ٢٠١٠).

These results are in harmony with those obtained by Mohamed *et al*., (٢٠١٠) and Alam *et al*., (٢٠١٢).

٢- Yield components:

Data in Table (٣) obviously reveal that fertilizing wheat plants with the suitable N via ٥٠ to ٧٥ % inorganic N form plus ٢٥ to ٥٠ % any one of the three organic manures enriched with EM significantly improving the four yield components. Spike length, number of seeds/ spike, ١٠٠٠ seed weight and number of grains per plant were improved in comparison to using N completely via inorganic N or with addition N via ٢٥ % inorganic plus ٧٥ % any one of the three organic manures enriched with EM. There was a gradual promotion on these yield components with reducing percentages of inorganic N from ١٠٠ to ٥٠ % and at the same increasing percentages of organic manures enriched with EM from ٠.٠ to ٥٠ %. Reducing inorganic N from ٥٠ to ٢٥ % and increasing percentages of any one of the three organic manures enriched with EM from ٥٠ to ٧٥ % significantly decreased the values of these crop components. The superiority of organic manures enriched with EM in improving these yield components could be arranged in ascending order as follows; filter mud, compost and poultry manure. Supplying the plants with N via ٥٠ % inorganic N plus ٥٠ % poultry manure enriched with EM gave the maximum values of yield components. Treating the plants with N as

٢٥ % inorganic N form plus ٧٥ % filter mud enriched with EM gave the lowest values. These results were similar during both seasons.

The important role of organic and biofertilization on producing healthy plants may explain the present results.

These results are in harmony with those obtained by Mohamed *et al*., (٢٠١٠) and Alam *et al*., (٢٠١٢).

Table ٢: Effect in inorganic N and some organic manures enriched with EM on plant height as well as yield and yield components of wheat cv. Sids- ١٢ plants during ٢٠١٠/ ٢٠١١ and ٢٠١١/ ٢٠١٢ seasons.

Inorganic, organic and biofertilization treatments	Plant height (cm.)		Spike length (cm.)		Number of grains/ spike		١٠٠٠ seed weight (g.)		No. of grains per plant		Grain yield/ plant (g.)	
	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢
١٠٠ % inorganic N (inorg.)	٦٠.٠	٦١.٢	٧.٠	٦.٧	٣٥.٦	٣٤.٩	٢٦.٥	٢٦.١	١٤٢.٤	١٣٩.٦	٣.٧٧	٣.٦٤
٧٥ % inorg. N + ٢٥ % compost enr. EM	٦٧.٥	٦٨.٦	٨.٤	٨.١	٣٨.٤	٣٧.٧	٢٨.١	٢٧.٧	١٥٣.٦	١٥٠.٨	٤.٣٢	٤.١٨
٧٥ % inorg. N + ٢٥ % filter mud enr. EM	٦٣.٤	٦٤.٥	٧.٧	٧.٤	٣٧.١	٣٦.٤	٢٧.٣	٢٦.٧	١٤٨.٤	١٤٥.٦	٤.٠٥	٣.٨٩
٧٥ % inorg. N+ ٢٥ % poultry manure enr. EM	٧١.٠	٧٢.٣	٩.١	٨.٨	٤٠.٢	٣٩.٥	٢٩.٠	٢٨.٥	١٦٠.٨	١٥٨.٠	٤.٦٦	٤.٥٠
٥٠ % inorg. N + ٥٠ % compost enr. EM	٨٢.٠	٨٣.١	١٠.٤	١٠.١	٤٢.٩	٤٢.٢	٣٠.٩	٣٠.٤	١٧١.٦	١٦٨.٨	٥.٣٠	٥.١٣
٥٠ % inorg. N + ٥٠ % filter mud enr. EM	٧٧.٠	٧٨.٢	٩.٨	٩.٥	٤١.٦	٤١.٠	٣٠.٠	٢٥.٥	١٦٦.٤	١٦٤.٠	٤.٩٩	٤.١٨
٥٠ % inorg. N+ ٥٠ % poultry manure enr. EM	٩٠.٠	٩١.٢	١١.٢	١٠.٩	٤٤.٧	٤٤.٠	٣٢.٠	٣١.٥	١٧٨.٨	١٧٦.٠	٥.٧٢	٥.٥٤
٢٥ % inorg. N + ٧٥ % compost enr. EM	٥١.١	٥٢.٣	٥.٧	٥.٤	٣٢.٦	٣٢.٠	٢٤.٨	٢٤.٣	١٣٠.٤	١٢٨.٠	٣.٢٣	٣.١١
٢٥ % inorg. N + ٧٥ % filter mud enr. EM	٤٧.٠	٤٨.٢	٥.١	٤.٨	٣١.١	٣٠.٤	٢٤.٠	٢٣.٥	١٢٤.٤	١٢١.٦	٢.٩٩	٢.٨٦
٢٥ % inorg. N+ ٧٥ % poultry manure enr. EM	٥٦.٣	٥٧.٥	٦.٣	٦.٠	٣٤.٠	٣٣.٣	٢٥.٧	٢٥.٢	١٣٦.٠	١٣٦.٠	٣.٥٠	٣.٣٦
New L.S.D at ٠.٠٥	**٣.٠**	**٣.١**	**٠.٥**	**٠.٥**	**١.٤**	**١.٤**	**٠.٧**	**٠.٧**	**٥.١**	**٤.٩**	**٠.١٥**	**٠.١٣**

Enr. = Enriched with

٣- Yield per plant and per feddan.

It is worth to mention that fertilizing wheat plants with the suitable N through ٥٠ to ٧٥ % inorganic N form plus ٢٥ to ٥٠ % of any of the three organic manures enriched with EM significantly improved grain and straw yields per plant and per feddan. Also, biomass per feddan was improved comparing with using N via ١٠٠ % inorganic N, or with supplying N as ٢٥ % inorganic plus ٧٥ % of any one of the three organic manures enriched with EM. The promotion on yields of wheat plants may attribute partially to reducing mineral N from ١٠٠ to ٥٠ % and increasing percentages of organic manure enriched with EM from ٠.٠ to ٥٠ %. Yield was significantly reduced with reducing inorganic N from ٥٠ to ٢٥ % and increasing percentages of organic manures enriched with EM from ٥٠ to ٧٥ %.

The best organic manure was poultry manure, followed by compost. The maximum grain yield (٢.٨٦ and ٢.٧٧ tons), straw yield (٢.٩٥ and ٣.٠ tons) and biomass (٥.٨١ and ٥.٧٧ tons) per feddan were recorded with supplying the plants with the suitable N via ٥٠ % inorganic N plus ٥٠ % poultry manure enriched with EM during both seasons, respectively. The minimum grain yield (١.٥٠ and ١.٤٣ tons), straw yield (٢.٠ and ٢.٠ tons) and biomass (٣.٥٠ and ٣.٤٣ tons) were recorded for wheat plants that received N via ٢٥ % inorganic N plus ٧٥ % filer mud enriched with EM during both seasons, respectively. Theses results were similar during both seasons.

The great benefits of organic and biofertilization on enhancing growth, nutritional status of plants and yield components could explain the present results.

Similar results were reported by Shoman *et al*., (٢٠٠٦), Arif *et al*., (٢٠٠٦) and Parvez *et al*., (٢٠٠٩).

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Table ٣: Effect in inorganic N and some organic manures enriched with EM on yield, yield components of wheat cv. Sids- ١٢ plants during ٢٠١٠/ ٢٠١١ and ٢٠١١/ ٢٠١٢ seasons.

Inorganic, organic and biofertilization treatments	Straw yield per plant		Grain yield/ fed. (tons)		Straw yield/ fed. (tons)		Yield biomass/ fed (tons)		Proteins %		Fat %	
	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢
١٠٠ % inorganic N (inorg.)	٤.٨	٤.٩	١.٨٩	١.٨٢	٢.٤٠	٢.٤٥	٤.٢٩	٤.٢٧	١٢.٢	١٢.١	٢.٣٠	٢.٣٥
٧٥ % inorg. N + ٢٥ % compost enr. EM	٥.٣	٥.٤	٢.١٦	٢.٠٩	٢.٦٥	٢.٧٠	٤.٨١	٤.٧٩	١٣.٠	١٢.٩	٢.٤٢	٢.٤٧
٧٥ % inorg. N + ٢٥ % filter mud enr. EM	٥.١	٥.١	٢.٠٣	١.٩٥	٢.٥٥	٢.٥٥	٤.٥٨	٤.٥٠	١٢.٦	١٢.٥	٢.٣٦	٢.٤١
٧٥ % inorg. N+ ٢٥ % poultry manure enr. EM	٥.٦	٥.٨	٢.٣٣	٢.٢٥	٢.٨٠	٢.٩٠	٥.١٣	٥.١٥	١٣.٦	١٣.٥	٢.٤٧	٢.٥٢
٥٠ % inorg. N + ٥٠ % compost enr. EM	٥.٨	٥.٩	٢.٦٥	٢.٥٧	٢.٩٠	٢.٩٥	٥.٥٥	٥.٥٢	١٣.٥	١٣.٤	٢.٦٠	٢.٦٥
٥٠ % inorg. N + ٥٠ % filter mud enr. EM	٥.٧	٥.٩	٢.٥٠	٢.٠٩	٢.٨٥	٢.٩٥	٥.٣٥	٥.٠٤	١٣.٤	١٣.٣	٢.٥٢	٢.٥٧
٥٠ % inorg. N+ ٥٠ % poultry manure enr. EM	٥.٩	٦.٠	٢.٨٦	٢.٧٧	٢.٩٥	٣.٠٠	٥.٨١	٥.٧٧	١٣.٦	١٣.٥	٢.٦٦	٢.٧١
٢٥ % inorg. N + ٧٥ % compost enr. EM	٤.٢	٤.٢	١.٦٢	١.٥٦	٢.١٠	٢.١٠	٣.٧٢	٣.٦٦	١١.٥	١١.٤	٢.١٦	٢.٢١
٢٥ % inorg. N + ٧٥ % filter mud enr. EM	٤.٠	٤.٠	١.٥٠	١.٤٣	٢.٠٠	٢.٠٠	٣.٥٠	٣.٤٣	١١.٢	١١.١	٢.١١	٢.١٦
٢٥ % inorg. N+ ٧٥ % poultry manure enr. EM	٤.٦	٤.٧	١.٧٥	١.٦٨	٢.٣٠	٢.٣٠	٤.٠٥	٣.٠٨	١١.٨	١١.٧	٢.٢١	٢.٢٦
New L.S.D at ٠.٠٥	٠.٢	٠.٢	٠.١١	٠.١٠	٠.٠٩	٠.٠٩	٠.١٥	٠.١٥	٠.٣	٠.٣	٠.٠٥	٠.٠٥

٤- Enr. = Enriched with

٥- Chemical composition of leaves and seeds.

Data in Tables (٤ & ٥) clearly show that fertilizing wheat plants with the suitable N through ٢٥ to ٧٥ % inorganic N form plus any one of the three organic manures enriched with EM at ٢٥ to ٧٥ % significantly stimulated proteins %, fats %, Ca, P & K in the seeds. Also, percentages of P, K, Mg and plant pigments in the leaves were improved in comparison to using N via inorganic form at ١٠٠ %. There was a gradual promotion on components of seeds and leaves with reducing inorganic N form percentages from ١٠٠ to ٢٥ % and increasing percentages of organic manures enriched with EM from ٠.٠ to ٧٥ %. The best organic manure applied with inorganic N was poultry manure, followed by compost. Filter mud manure occupied the last position in this respect. Nitrogen percentage in the leaves significantly reduced with using N as ٢٥ to ٧٥ % inorganic N plus any one of the three organic manure enriched with EM at ٢٥ to ٧٥ % rather than using N as mineral N at ١٠٠ %. When N was added via ٢٥ % inorganic N plus ٧٥ % of any one of the three organic manures enriched with EM recorded low results . The maximum values of all nutrients except N in the leaves were recorded on the plant fertilized with N as ٢٥ % inorganic N plus ٧٥ % poultry manure enriched with EM. Amending the plants with N through ١٠٠ % inorganic N gave the greatest percentage of N in the leaves. The minimum values of all nutrients in the leaves and seeds (except N in the leaves) were recorded on the plants that received N completely via inorganic form (١٠٠ % inorganic N form). These results were similar during both seasons.

The present effect of organic and biofertilization on enhancing nutrients in the leaves and seeds may attributed to their positive action on enhancing soil fertility and the availability of nutrients especially N and Mg which are responsible for stimulating the biosynthesis of plant pigments (Nijjar, ١٩٨٥ and Yaduvanshi, ٢٠٠٣).

These results are in harmony with those obtained by Wisal (٢٠٠١); Zeidan and Kramany (٢٠٠١); Alam *et al*., (٢٠٠٥) and Ahmed *et al*., (٢٠١١).

٦- Seed content of nitrite.

It is clear from the data in Table (٥) that nitrite (ppm) in the seeds was significantly reduced in response to fertilizing of wheat plants with the suitable N through ٢٥ to ٧٥ % inorganic N plus ٢٥ to ٧٥ % any one of the three organic manures enriched with EM. The reduction on nitrite in the seeds was proportional associated with the reduction in percentages of inorganic N from ١٠٠ to ٢٥ % and increase in the percentages of organic manures enriched with EM from ٠.٠ to ٧٥ %. The efficiency of the three organic manures on reducing nitrite content in the seeds could be arranged in ascending order as follows; filter mud, compost and poultry manure. The lowest values (٠.٦٢ and ٠.٥٠ ppm during both seasons) recorded on the seeds harvested from plant fertilized with N via ٢٥ % inorganic N plus poultry manure enriched with EM at ٧٥ %. Fertilizing of wheat plants with N through ١٠٠ % inorganic gave the maximum values of nitrite in the seeds (٢.١١ and ٢.٠٠ ppm during both seasons). These results were similar during both seasons.

The great checking on the uptake of N % in response to organic and biofertilization could result in reducing nitrite content.

These results are nearly in the same line with those obtained by Abad (٢٠٠٤) and Alam *et al*., (٢٠١٢).

As a conclusion, it is suggested to use the suitable N (٧٥ kg N/ fed./ year) via ٥٠ % inorganic N plus ٥٠ % poultry manure enriched with EM for improving yield and yield components of wheat. Also, these applications helped in controlling nitrite pollution in wheat cv. Sids- ١٢ fields.

Table ٤: Effect in inorganic N and some organic manures enriched with EM on plant pigments and leaf content of N and P of wheat cv. Sids- ١٢ plants during ٢٠١٠/ ٢٠١١ and ٢٠١١/ ٢٠١٢ seasons.

Inorganic, organic and biofertilization treatments	Chlorophyll a (mg/ ١ g. F.W)		Chlorophyll b (mg/ ١ g. F.W)		Total chlorophylls (mg/ ١ g. F.W)		Total carotenoids (mg/ ١ g. F.W)		Leaf N %		Leaf P %	
	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢
١٠٠ % inorganic N (inorg.)	١.٩٩	٢.٠٥	١.٤٩	١.٥٥	٣.٤٨	٣.٦٠	١.٥٥	١.٦٣	٢.٥٥	٢.٥٩	٠.١١	٠.١٢
٧٥ % inorg. N + ٢٥ % compost enr. EM	٢.١٥	٢.٢١	١.٦٥	١.٧١	٣.٨٠	٣.٩٢	١.٧١	١.٧٩	٢.٤٠	٢.٤٤	٠.١٦	٠.١٦
٧٥ % inorg. N + ٢٥ % filter mud enr. EM	٢.٠٧	٢.١٣	١.٥٧	١.٦٣	٣.٢٠	٣.٧٦	١.٦٣	١.٧٢	٢.٣٨	٢.٣٧	٠.١٤	٠.١٥
٧٥ % inorg. N+ ٢٥ % poultry manure enr. EM	٢.٣٠	٢.٣٦	١.٨٠	١.٨٧	٤.١٠	٤.٢٣	١.٨٧	١.٩٦	٢.٤٥	٢.٤٨	٠.١٩	٠.٢٠
٥٠ % inorg. N + ٥٠ % compost enr. EM	٢.٤٤	٢.٥٠	٢.٠٠	٢.٠٠	٤.٤٤	٤.٥٠	٢.٠٨	٢.١٧	٢.١٦	٢.٢٠	٠.٢٢	٠.٢٤
٥٠ % inorg. N + ٥٠ % filter mud enr. EM	٢.٣٧	٢.٤٣	١.٨٧	١.٩٣	٤.٢٤	٤.٣٦	١.٩٤	٢.٠٢	٢.١٠	٢.١٤	٠.٢١	٠.٢١
٥٠ % inorg. N+ ٥٠ % poultry manure enr. EM	٢.٥٢	٢.٥٩	٢.٠٢	٢.٠٧	٤.٥٤	٤.٦٦	٢.١٠	٢.١٨	٢.٢٤	٢.٢٨	٠.٢٤	٠.٢٥
٢٥ % inorg. N + ٧٥ % compost enr. EM	٢.٧٠	٢.٧٦	٢.٢٠	٢.٢٦	٤.٩٠	٥.٠٢	٢.٢٧	٢.٣٥	١.٩٩	٢.٠٣	٠.٢٦	٠.٢٧
٢٥ % inorg. N + ٧٥ % filter mud enr. EM	٢.٦١	٢.٦٧	٢.١١	٢.١٧	٤.٧٢	٤.٨٤	٢.٢٠	٢.٢٨	١.٩٥	١.٩٩	٠.٢٥	٠.٢٦
٢٥ % inorg. N+ ٧٥ % poultry manure enr. EM	٢.٧٩	٢.٨٥	٢.٢٩	٢.٣٥	٥.٠٨	٥.٤٠	٢.٣٧	٢.٤٥	٢.٠٥	٢.١٠	٠.٢٧	٠.٢٨
New L.S.D at ٠.٠٥	٠.٠٧	٠.٠٦	٠.٠٥	٠.٠٥	٠.٠٦	٠.٠٦	٠.٠٥	٠.٠٥	٠.٠٤	٠.٠٤	٠.٠٢	٠.٠٢

Enr. = Enriched with

Table ٥: Effect in inorganic N and some organic manures enriched with EM on leaf content of K & Mg (%) as well as seed content Ca, P, K (mg/ ١٠٠ g) and nitrite (ppm) of wheat cv. Sids- ١٢ plants during ٢٠١٠/ ٢٠١١ and ٢٠١١/ ٢٠١٢ seasons.

Inorganic, organic and Biofertilization treatments	Leaf K %		Leaf Mg %		Seed Ca (mg/ ١٠٠ g)		Seed P (mg/ ١٠٠ g)		Seed K (mg/ ١٠٠ g)		Seed nitrite (ppm)	
	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢	٢٠١٠/٢٠١١	٢٠١١/٢٠١٢
١٠٠ % inorganic N (inorg.)	١.٥١	١.٤٠	٠.٣١	٠.٢٨	٣١.١	٣٢.٧	٤٩١.٠	٥٠٠.٠	٤١١.٠	٤٢٠.٠	٢.١١	٢.٠٠
٧٥ % inorg. N + ٢٥ % compost enr. EM	١.٦٣	١.٥٢	٠.٣٧	٠.٣٤	٣٤.٠	٣٥.٧	٥٢٠.٠	٥٣٠.٠	٤٣١.٠	٤٤٠.٠	١.٦٠	١.٥٠
٧٥ % inorg. N + ٢٥ % filter mud enr. EM	١.٥٧	١.٤٧	٠.٣٤	٠.٣١	٣٢.٥	٣٤.٢	٥١١.٠	٥٢١.٣	٤٢١.٠	٤٣١.٠	١.٨٠	١.٧٠
٧٥ % inorg. N+ ٢٥ % poultry manure enr. EM	١.٧٠	١.٥٩	٠.٤٠	٠.٣٧	٣٥.٥	٣٦.٢	٥٢٣.٣	٥٣٣.٥	٤٥٠.٠	٤٥٩.٠	١.٥٠	١.٤٠
٥٠ % inorg. N + ٥٠ % compost enr. EM	١.٨٠	١.٧١	٠.٤٥	٠.٤٢	٣٨.٠	٣٨.٧	٥٣٢.٠	٥٤٣.٠	٤٧١.٠	٤٨١.٠	١.٠٩	١.٠٠
٥٠ % inorg. N + ٥٠ % filter mud enr. EM	١.٧٥	١.٦٤	٠.٤٢	٠.٣٩	٣٦.٧	٣٨.٤	٥٢٥.٠	٥٣٦.٠	٤٦٠.٠	٤٧٠.٠	١.٣٠	١.٢٠
٥٠ % inorg. N+ ٥٠ % poultry manure enr. EM	١.٨٧	١.٧٦	٠.٤٨	٠.٤٥	٣٩.١	٤٠.٣	٥٤١.٠	٥٥١.٠	٤٨٢.٠	٤٩٢.٠	١.٠٠	٠.٩١
٢٥ % inorg. N + ٧٥ % compost enr. EM	٢.٠١	١.٩١	٠.٦١	٠.٥٨	٤٣.٠	٤٤.١	٥٦٠.٠	٥٧١.٠	٤٩٦.٠	٤٩٠.٠	٠.٧٢	٠.٦٢
٢٥ % inorg. N + ٧٥ % filter mud enr. EM	١.٩٣	١.٨٣	٠.٥٢	٠.٤٩	٤١.٢	٤٢.٥	٥٥٠.٠	٥٦٠.٠	٤٨٩.٠	٤٩٩.٠	٠.٩٢	٠.٨١
٢٥ % inorg. N+ ٧٥ % poultry manure enr. EM	٢.١٠	٢.٠٠	٠.٦٨	٠.٦٥	٤٤.١	٤٥.٢	٥٦٦.٠	٥٧٦.٦	٥٠١.٠	٥١١.٠	٠.٦٢	٠.٥٠
New L.S.D at ٠.٠٥	٠.٠٤	٠.٠٥	٠.٠٥	٠.٠٢	١.١	٠.٩	٢.٠	٢.٢	٣.٠	٣.٠	٠.١١	٠.١١

Enr. = Enriched with

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محاولات لتقليل التلوث النيتريتى فى القمح صنف سدس – ١٢ باستخدام بعض الأسمدة العضوية المزودة بالكائنات الحية الدقيقة الفعالة

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تم تسميد نباتات القمح صنف سدس – ١٢ خلال موسمي ٢٠١٠ / ٢٠١١ ، ٢٠١١/ ٢٠١٢ بالنيتروجين (٧٥ كيلو جرام/ الفدان) إما من خلال التسميد الغير عضوي بنسبة ١٠٠ % من الكمية الموصى بها من النيتروجين أو باستبدال نسبة ٢٥ الى ٧٥ % من السماد المعدني باستخدام الكمبوست ، طينة المرشحات أو سماد زرق الدواجن المزودة بالكائنات الحية الدقيقة الفعالة (EM).

أكدت نتائج هذه الدراسة على التأثيرات المفيدة لاستخدام السماد الغير عضوي بنسبة ٥٠ % من الكمية الموصى بها جنبا الى جنب مع أى مصدر سماد عضوي مستخدم مزود بالكائنات الحية الدقيقة الفعالة بنسبة ٥٠ % على النمو وإنتاجية القمح صنف سدس – ١٢ وذلك بالمقارنة باستخدام الكمية الموصى بها من النيتروجين فى الصورة الغير عضوية فقط ولقد أدى استخدام الصورة المعدنية من النيتروجين بنسبة مئوية تقل عن ٥٠ % من الكمية الموصى بها حتى مع التسميد العضوي والحيوي الى تأثيرات سلبية على النمو وإنتاجية القمح. وكان أفضل مصدر للسماد العضوي يستخدم مع المصدر المعدني للنيتروجين هو سماد زرق الدواجن يليه الكمبوست وجاء سماد طينة المرشحات فى المرتبة الأخيرة فى هذا الصدد وكان هناك انخفاض ملحوظ فى محتوى البذور من النيتريت مع تقليل التسميد المعدني النيتروجينى وزيادة السماد العضوي المزود بالكائنات الحية الدقيقة الفعالة (EM).

إن تسميد نباتات القمح صنف سدس – ١٢ بالنيتروجين (٧٥ كيلو جرام للفدان فى السنة) من خلال ٥٠ % نيتروجين معدني جنبا الى جنب مع ٥٠ % سماد زرق الدواجن مزود بالكائنات الحية الدقيقة الفعالة يكون مفيدا لأجل تحسين الإنتاجية وتقليل تلوث البذور بالنيتريت.