Potential of Bioslurry and Compost at different levels of inorganic nitrogen to Improve Growth and Yield of Okra (*Hibiscus esculentus* L.)

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Overview

- Decent work
- Bioslurry and compost
- Application in the soil
- Link of bioslurry and compost with organic fertilization to help the rural community

Decent work

- **Decent work sums up the aspirations of people in their working lives. It involves following opportunities for work:**

- ✓ productive
- ✓ delivers a fair income
- ✓ security in the workplace
- ✓ social protection for families
- ✓ Ultimately that affect people lives

Current status of compost and bioslurry in Pakistan

- Among Asian countries, China, India and Bangladesh are major user of bioslurry and compost for sustainable agriculture.
- Use of bioslurry and compost concept is in initial stages in Pakistan.
- Dire need to focus on this technology for sustainable agriculture and helping the rural community.

What is Bioslurry?

- **Bioslurry is a byproduct, obtained from the biogas plant after the digestion of dung or other biomass for the generation of methane rich gas. (**Smith & Elliot,1990; George et al., 2005**)**
- **Digested slurry contains**
  - ✓ organic nitrogen (mainly amino acids)
  - ✓ abundant mineral elements, i.e. macro & micronutrients
  - ✓ low-molecular-mass bioactive substances
    - Hormones
    - Humic acids
    - Vitamins

Bioslurry application to soil: advantages

- Supplies essential nutrients
- Enhances water holding capacity
- Enhances soil aeration
- Accelerates root growth
- Inhibits weed seed germination

  (Pathak et al., 1992; Garg et al., 2005**).**
- Prevent adverse environmental impacts of waste disposal. **(**Garg et al., 2005**)**

Multi-dimensional benefits of bioslurry

- Balanced nutrition
- Pollution free
- Defense against pests
- Maintains soil fertility
- Quality food

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What is Compost?

- Aerobically decomposed organic material derived from plants and animal source.
- Rich in nutrients
- Used in gardens, landscaping, horticulture and agriculture (for field crops). (Martens, 2000)

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Advantages of Compost

- Act as soil conditioner
- Organic fertilizer
- Source of humus or humic acid
- Act as a natural pesticide for soil
- Useful for erosion control

(Martens., 2000)

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Need of Work

Organic matter in soils of Pakistan less than 1%

Reasons?

- ✓Semiarid and arid climate
- ✓Extensive farming, i.e. continues mining of nutrients
- ✓Extensive use of inorganic fertilizers
- ✓Lack of organic farming
- ✓Poor extension services

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Continue…

- How to use organic material for sustainable crop production?
- ✓ Organic fertilizer can't be substitute of inorganic fertilizers
- ✓ But integrated use of organic and inorganic fertilizers can restore
  - fertility
  - Organic matter status of soil
  - Improve soil physical and chemical properties of soils
  - Mediate environmental adverse effects
  - Improve quantitatively and qualitatively crop production

(Sing et al., 1995)

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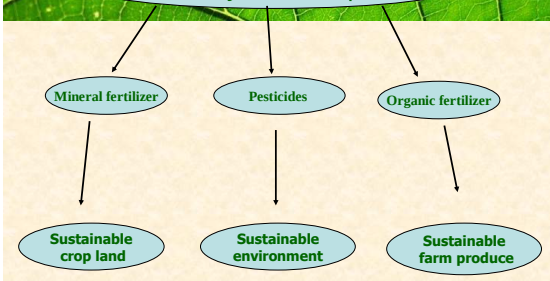
Bioslurry and Compost



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Objectives

- **Efficient utilization of waste material for Sustainable agriculture**
- **To know the best reduced level of N along with organic amendments**
- **Improvement in the soil quality**
  - Increasing soil fertility.
  - Increasing water-holding capacity of the soil.
  - Enhancing the micro-organisms activity in the soil.
- **To reduce the poverty by decent work, i.e.** this concept create new jobs, bring the development of biogas and compost related business in Pakistan

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MATERIALS AND METHODS

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Experiment

- **Type:** Field Experiment
- **Crop:** Okra (*Hibiscus esculentus L.*)
- **No of treatments:** 7
- **No of replication:** 3
- **Exp. Design:** RCBD

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Treatment Plan

- T_1 = Control (Recommended NPK)
- T_2 = Bio-slurry @ 600 kg ha^{-1} + 100 % N + recommended P & K
- T_3 = Bio-slurry @ 600 kg ha^{-1} + 75 % N + recommended P & K
- T_4 = Bio-slurry @ 600 kg ha^{-1} + 50 % N + recommended P & K
- T_5 = Compost @ 600 kg ha^{-1} + 100 % N + recommended P & K
- T_6 = Compost @ 600 kg ha^{-1} + 75 % N + recommended P & K
- T_7 = Compost @ 600 kg ha^{-1} + 50 % N + recommended P & K

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Parameters studied

1. Plant height (cm)
2. Number of branches
3. Number of fruit sets
4. Fruit yield per plant
5. Number of fruits per plot
6. Root weight
7. Root length
8. NPK uptake in root, shoot and fruit
9. Residual effect of bioslurry and compost on soil

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Results

Application of bioslurry and compost along with different rates of inorganic N showed positive effect on:

i) Plant physiological characteristics

ii) NPK uptake and

iii) Residual effect on Soil.

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Effect on physiological characters

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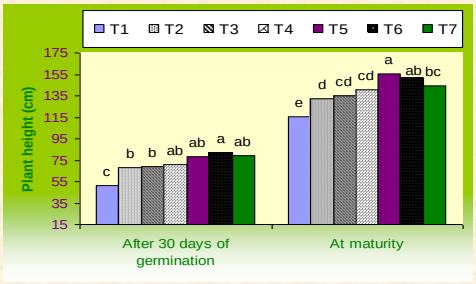
Effect on Plant height



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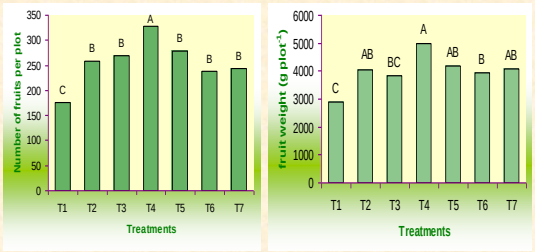
Effect on No. of fruits & fruit weight



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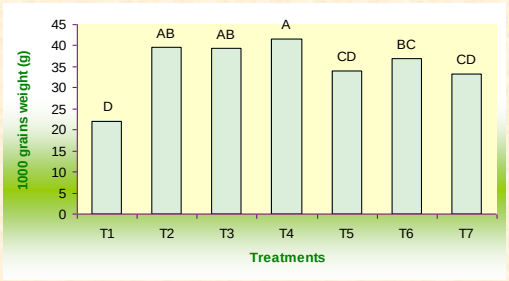
Effect on 1000 seed weight



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Effect on NPK uptake

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Positive effect on NPK uptake

Treatments	NPK Uptake by root and shoot					
	NUR[W]	NUS[X]	PUR[Y]	PUS[Z]	KUR[A]	KPS[B]
T_1	42 c[m]	154 c	0.5 c	2 c	43 d	228 bc
T_2	49 bc	277 a	0.8 c	4 c	93 a	329 a
T_3	43 c	273 a	1.5 c	6 ab	59 cd	262 b
T_4	53 b	253 ab	2.6 a	10 a	74 bc	292 ab
T_5	71 a	229 b	2.8 a	12 a	87 b	261 b
T_6	52 b	232 b	1.8 b	9 b	80 b	227 bc
T_7	38 d	244 ab	2.1 ab	9 b	67 bc	198 c

[m] Means not sharing similar letter(s) differ significantly at 0.05 level of probability according to LSD Test.
[W] N uptake by root), [X]N uptake by shoot (mg plant^{-1}), [Y]P uptake by root (mg plant^{-1}), [Z]P uptake by shoot (mg plant^{-1}), [A]K uptake by root (mg plant^{-1}) and [B]K uptake by shoot (mg plant^{-1})

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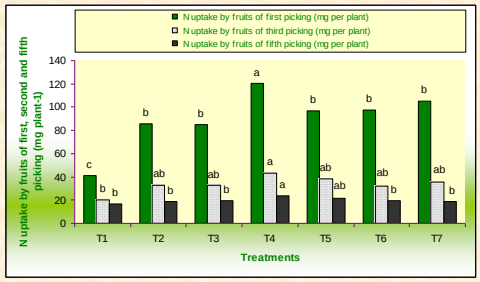
N uptake by different stages of fruit pickings



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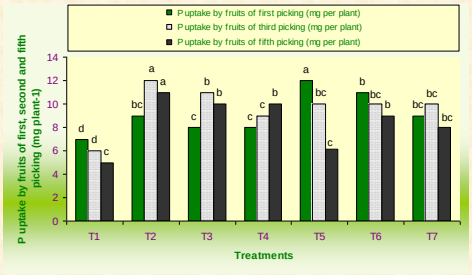
P uptake by different fruit pickings



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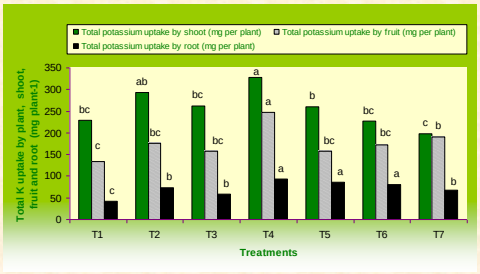
K uptake by different fruit pickings



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Residual effect

Treatment	Treatment detail	pH	% O.M	% N	P_2O_5 ppm	K_2O ppm
A	Before experiment	7.7	0.72	0.06	6.01	302
B	After experiment					
T_1	Control	7.67	0.64	0.05	6.51	312
T_2	Bio-slurry @ 600 kg ha^{-1} + Recommended NPK ha^{-1}	7.60	1.01	0.12	7.08	340
T_3	Bio-slurry @ 600 kg ha^{-1} + 75% Recommended N ha^{-1}	7.68	1.05	0.09	6.95	335
T_4	Bio-slurry @ 600 kg ha^{-1} + 50% Recommended N ha^{-1}	7.65	1.04	0.08	6.92	335
T_5	Compost @ 600 kg ha^{-1} + Recommended NPK ha^{-1}	7.68	1.02	0.09	7.01	390
T_6	Compost @ 600 kg ha^{-1} + 75 % Recommended N ha^{-1}	7.62	1.01	0.11	6.85	345
T_7	Compost @ 600 kg ha^{-1} + 50 % Recommended N ha^{-1}	7.58	0.098	0.09	6.94	366

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Future Prospects

- For a detailed study long term experiment is required
- Value addition can be beneficial
- Awareness among rural communities of Pak.

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Conclusion

- Application of bio-slurry and compost at reduced levels of inorganic N has a positive effect on plant and soil environment.
- Use of slurry and compost will effect the life of rural community with their multi-dimensional scope.
- Link with organic farming and sustainable agriculture

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THANKS