
بسم الله
الرحمن

Growing tomato with urban sewage water

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Introduction of waste water

- Practiced since centuries.
- Oldest e.g. in Melboroune Australia established 1897.
- In Pak 30% for irrigation 64% in rivers.
- It consist of 96% of water .
- 20 million ha area in 50 countries is irrigated.

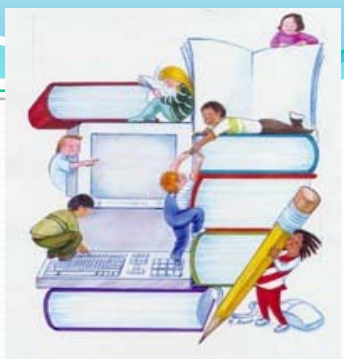
Mustafa, *et al* 2002.FAO,1992. Scott, *et al*, 2004.

Why waste water?

- In Pakistan shortage of irrigation water
- Mainly two sources
- Canal water and Ground water
- Scarcity of canal water dependency on ground water
- Ground water expensive, unaffordable, also inferior quality.
- Alternate solution is waste water

Asma zafar et al , 2003

Pros of waste water



- All N, much of P and K required for crop production
- Reduces pollution of rivers, canals etc.
- Conserve nutrients & water.
- Provide micronutrients , organic matter.
- Reduce cost of production 10-20%.

Qadir ,et al , 2010. Jimenez, 2005.FAO,1992.

Cons of waste water

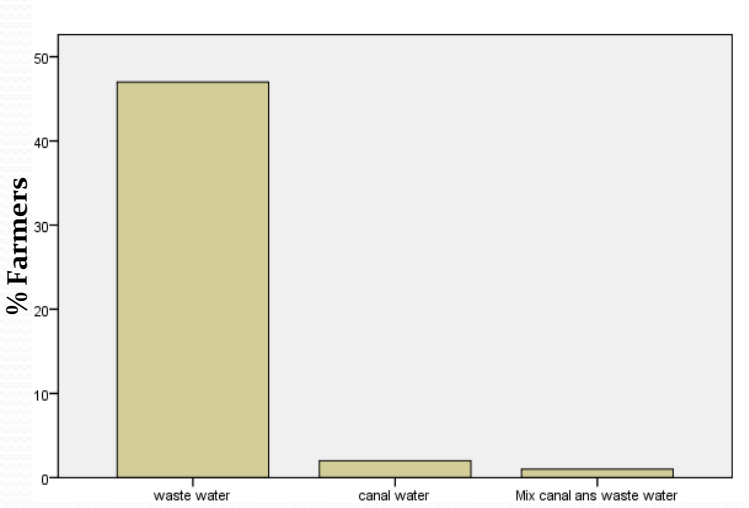
- Contamination of Ground water
- Build up of chemicals (Heavy metals)
- Creation of habitat for microorganisms

Mapanda et al , 2007.,Al-Lahham et al,2003

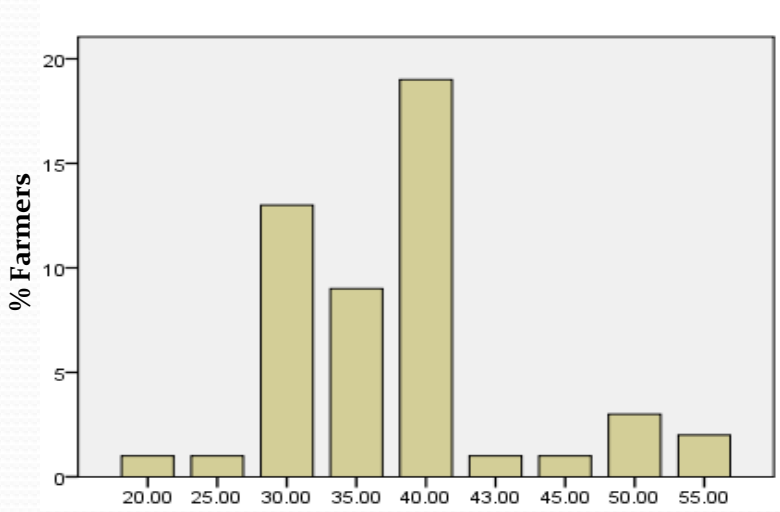
Objectives

- Base line survey in peri-urban area to know farmers perceptions about waste water perceptions
- To find out variability among different crops for heavy metals uptake & accumulation
- Determination of variability among different tomato genotypes for heavy metals uptake & accumulation in different plant.
- Determination of the genetic and molecular basis of heavy metal tolerance

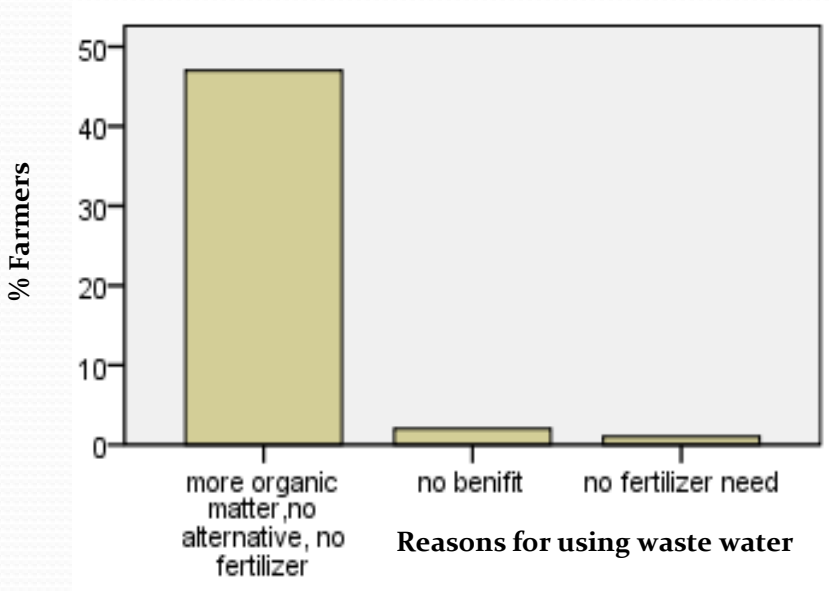
Base line Survey from peri-urban area of Faisalabad using waste water for irrigation purpose :-



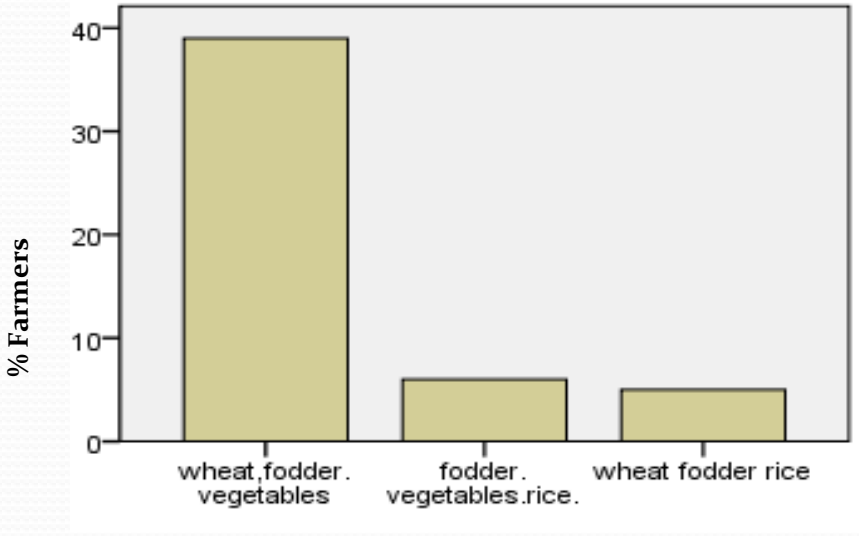
Irrigation water



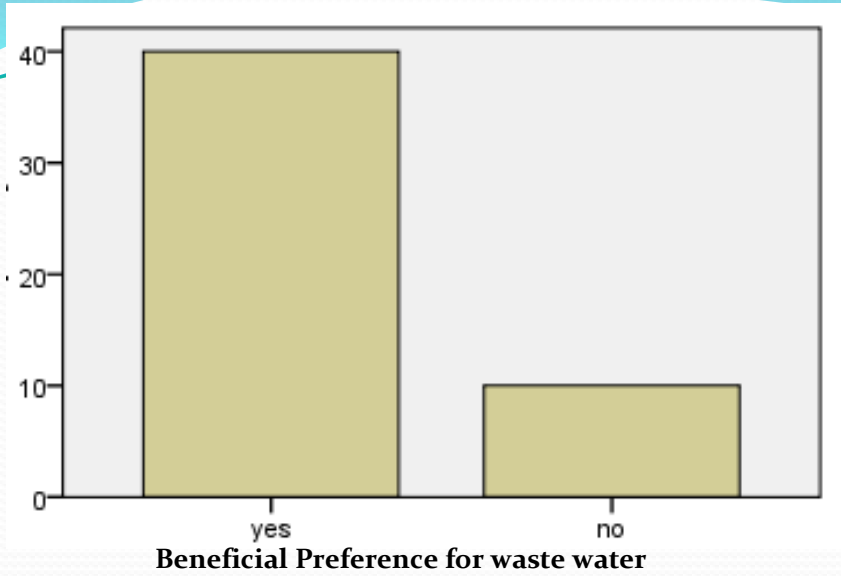
Years using waste water

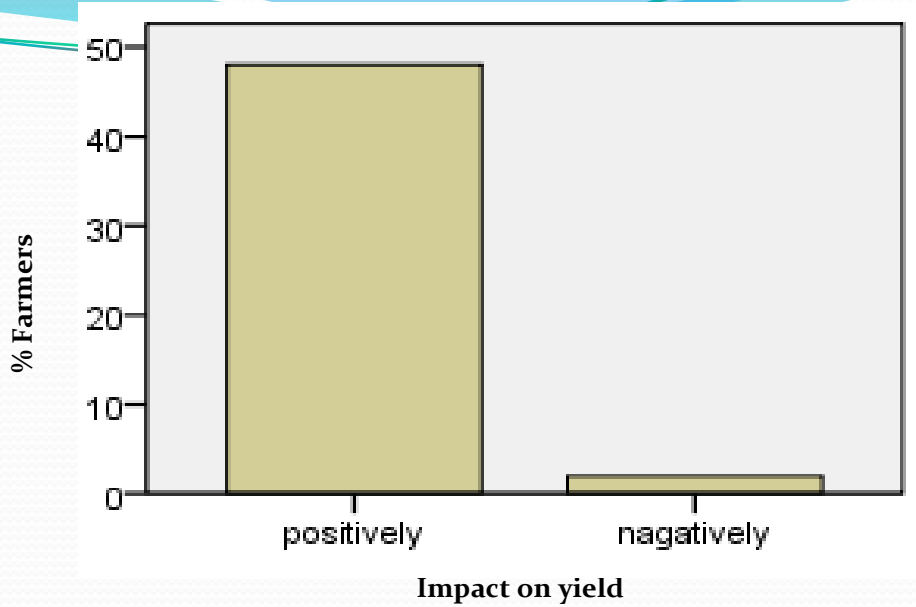


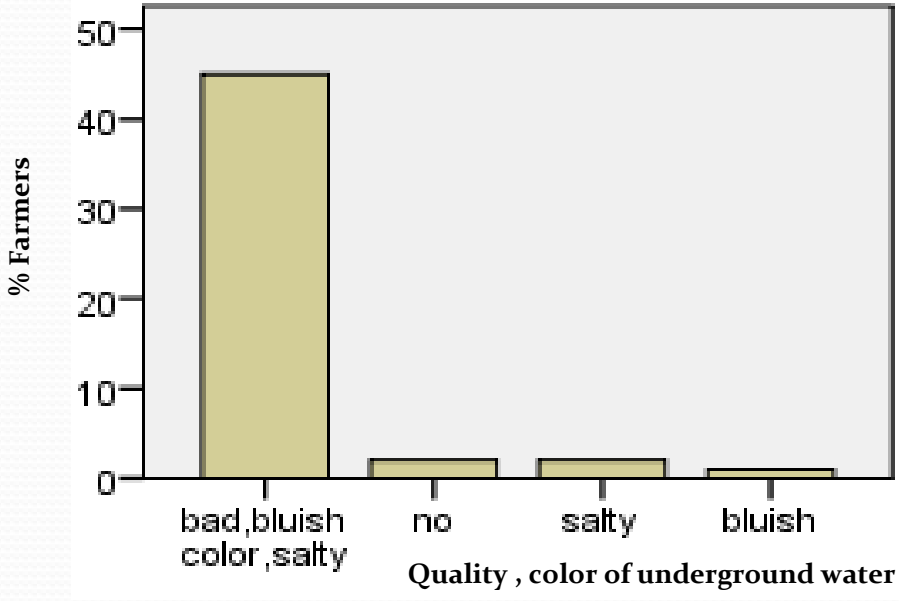
Reasons for using waste water

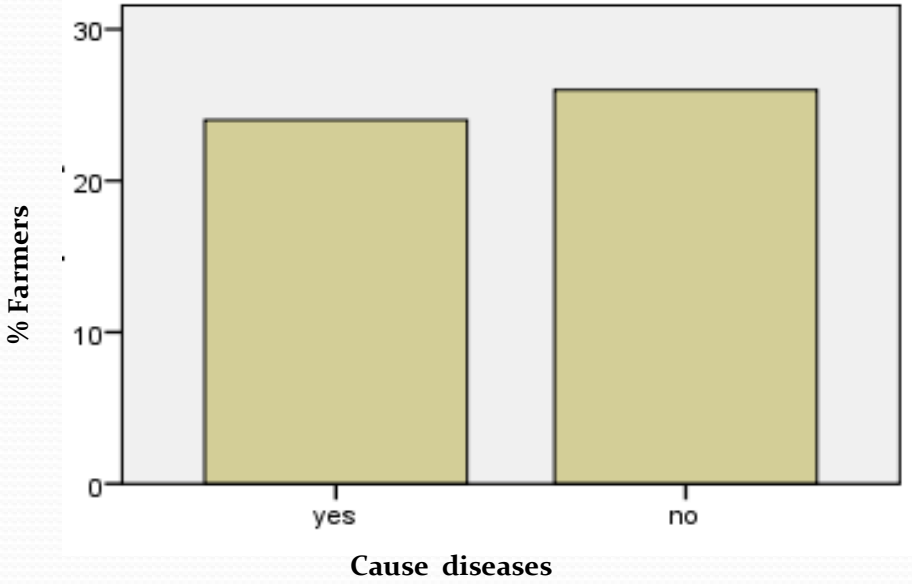


Major crops grown


% Farmers
40
30
20
10
0
yes
no
Beneficial Preference for waste water


% Farmers
50
40
30
20
10
0
positively
nagatively
Impact on yield


% Farmers
50
40
30
20
10
0
bad,bluish color,salty
no
salty
bluish
Quality , color of underground water


% Farmers
30
20
10
0
yes
no
Cause diseases

You have two options?

- Barren land?
- Crop Cultivation?

Because farmers have no alternative for irrigation all their lands converted into barren lands

Objective # 2

Methodology

Atomic absorption spectrophotometer for heavy metals determination

Plant sample

Dried Powdered

Acids addition

Digestion

Results:

Genotypes	Ni ppm	Zn ppm	Pb ppm	Cr ppm	Mn ppm
S.cane	3.00	10.5	1.00	18.45	10
Lucern	3.00	40.5	2.00	21.3	33.5
Luttec	3.00	53	0.00	20.5	18.5
Cabbage	3.00	23.5	0.00	16	20
G.sarso	2.50	42.5	1.00	10.65	41.5
G.sarso	3.00	65.5	1.00		68
wheat	0.00	34	1.00	9.45	27
Desi sarso	2.50	65.5	0.00	12.7	27.5
Tendian	2.50	37	0.00	11.5	8
Cabbage	4.00	63.5	1.50	18.45	17
Desi sarso	3.50	32.5	2.00	42.6	49
Lucern	3.00	45.5	2.50	18.05	40

Objective # 4

Methodology

Germplasm collection & Sowing

Nursery preparation and transplanting

Two treatments after Transplanting

1) Waste water
2) Normal water

Field Screening:

- 44 Genotypes screened out for yield related traits and heavy metals accumulation.
- Morphological, physiological & chemical parameters
- Heavy metals uptake in fruits , shoots , leaves & roots
- No of fruits/cluster/plant , flowers/cluster
- pH, TDS , EC

Results:

PB-3 have highest yield & PB-65 have the lowest yield.

While PB-34 was highly tolerant & HT-9076-08 was highly susceptible genotypes for heavy metals accumulation.

Future Goals:

- Contrasting genotypes will be crossed
- Characterization of genotypes using genes related to heavy metals tolerance in highly tolerant and susceptible genotypes.
- 1. Hsp90 2. MT 3. GR

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