Nutrient fluxes and production efficiency in urban and periurban crops of Faisalabad, Pakistan

By

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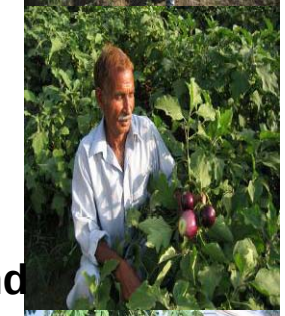


Introduction

Study Rationale:

- Expanding demographic structure of urban & peri-urban areas.
- Poor infrastructure of rural areas.
- Poor developed input and out put markets.

Existing farming situation:

- Ecologically and environmentally critical situation in city areas
- Consumers not producers.
- Recycling the nutrients

Aim of study:

Infrastructural analysis of UPA activities in the city of Faisalabad (where, how and what?)

Maintain sustainability in farming system.

Introduction (continue)

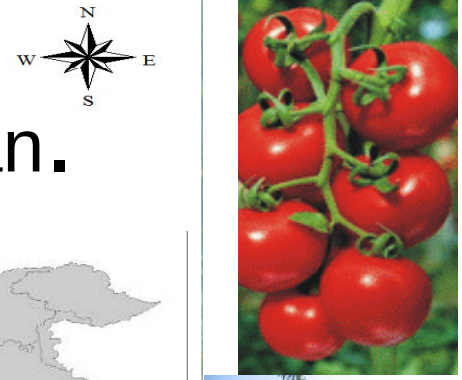
Parts of urban & peri-urban agriculture paradigm:

1. Poverty Reduction
2. Food and employment
3. High input intensities and productivities

Final use of knowledge gained:

1. Recommendations for sustainable management strategies.
2. To explore options for alternative cropping system. and healthy environment.

Study area(Faisalabad)



The third largest populated city of Pakistan.

Founding Year	1904
Number of Towns	8
Total area	0.58,million hectares
Cultivated area	0.51,million hectares
Total population	6.60 million (2006 Census)
Urban population	2.70 million > 3.0 million (2010)
Soil	Silt Loam
Rainfall	Avg. 425 mm/y

Objectives and hypotheses

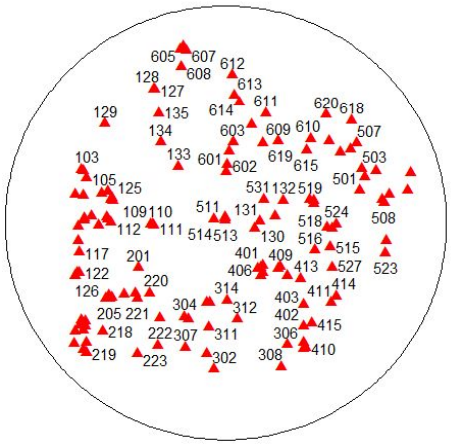
1. To analyze the existing infrastructure and available resources, their utilization to make sustainable farming system.
2. To quantify the nutrients flow and nutrient use efficiency to develop strategies for the growers.

Horticulture in UP areas operates under economically viable and ecologically critical conditions.

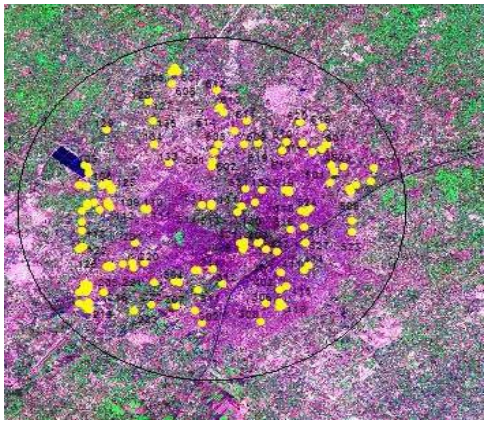



Methodology
(Part 1)

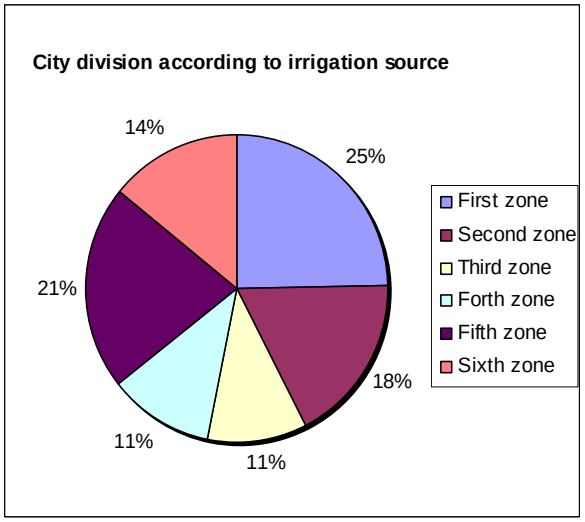
- Baseline survey, sampling site and division of study area
- Household interviewed 140
- Sampling method: Stratified sampling approach



Household distribution



Satellite image



Common problems in crop production

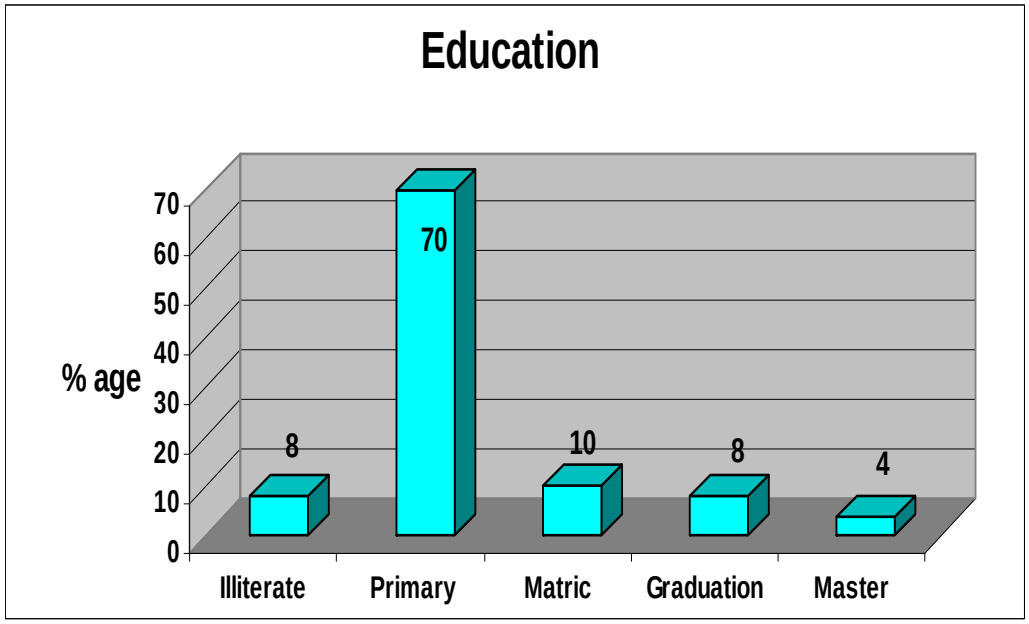
Investment	Yes 83 % 1st
Fertilizer availability	Yes 79 % 2nd
Water availability	Yes 73 % 3rd
Labor availability	Yes 54 % 4th
Quality Seed availability	Yes 52 % 5th

Socioeconomic study of household

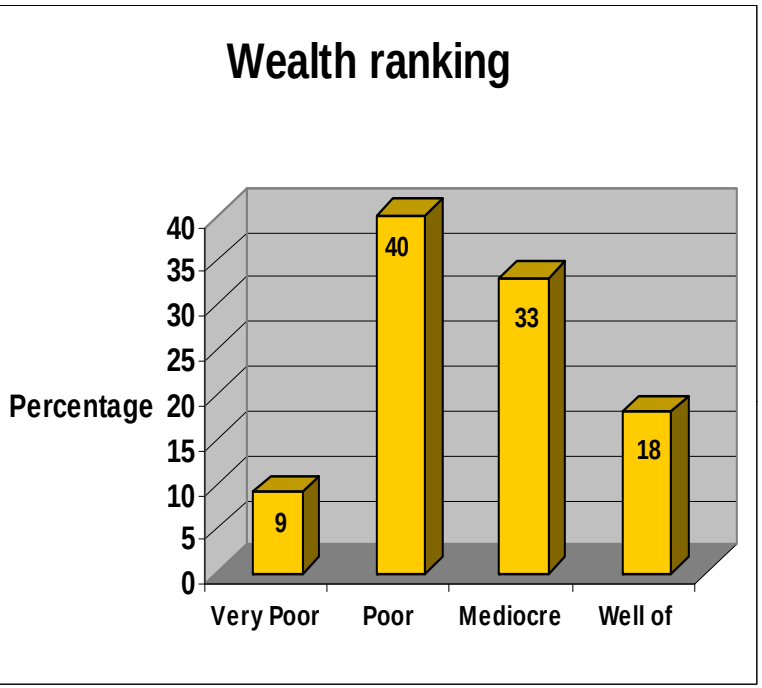
Household information

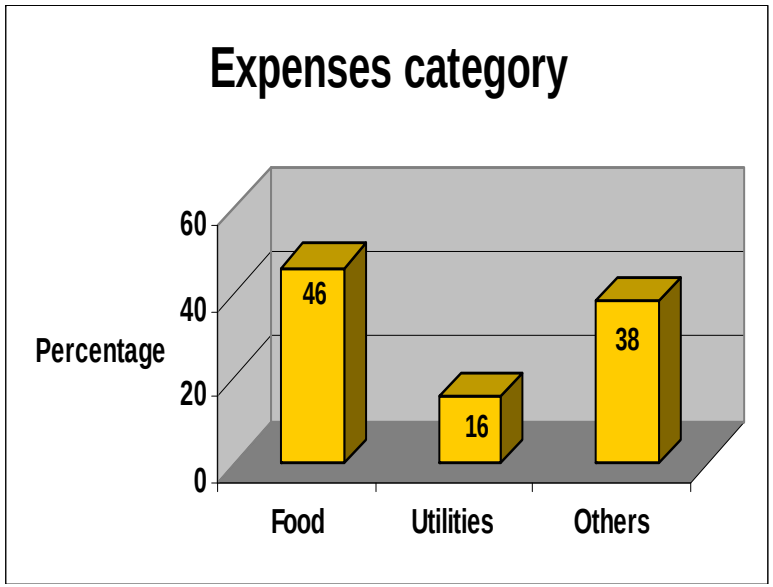
Structure	Joint family system
Total number	140
Marital Status	86 % married and 0.7% divorced and single is 15%

Education



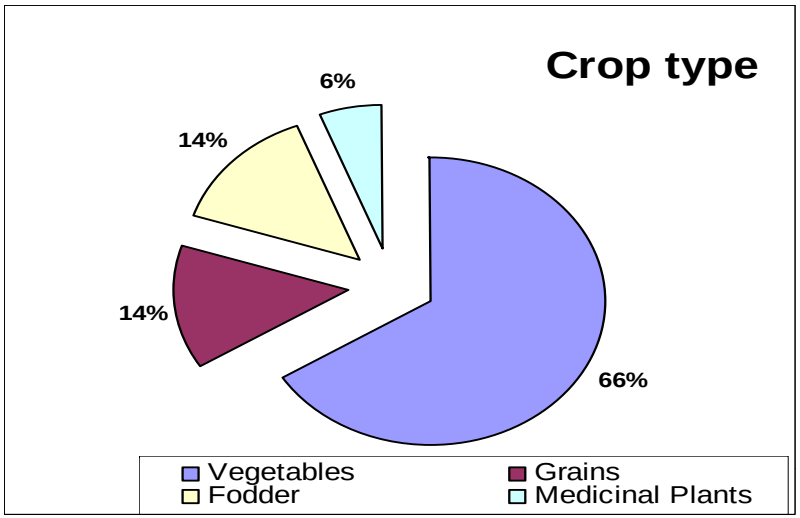
Socioeconomic study of household continue



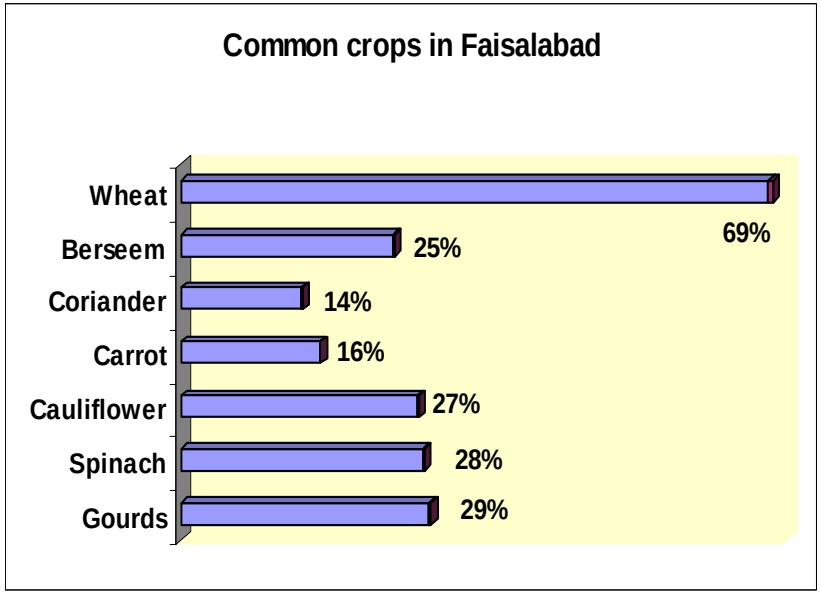


Crops diversity

Crops cultivated in the UP area of Faisalabad



Some commonly cultivated vegetables& field crops



Field Study

1-After analyzing existing resources,oppurtunities and constraints focus will be given to proper utilization of nutrient rich sewage water with optimum use of organic and inorganic fertilizers for sustainable vegetable production in UP areas.

2- Soil surface nutrient balances will be determine to analyze nutrient use efficiencies for better economic return by

A-Horizontal nutrients fluxes.

B-Vertical nutrients fluxes (leaching and gaseous emission).

3- Production efficiencies will be determine for the growers in Faisalabad and results will be applied to the other areas.

Cluster Analysis

Result of the cluster analysis for establishing site specific-typology of household

Cluster 1 (33)	**Selection of Household**
Small scale mixed farming with wastewater irrigation system	**Five from site one**
Cluster 2 (38)	
Medium scale field crops farming with mix water irrigation system	**Five from site two**
Cluster 3 (33)	
Large scale vegetable farming with canal irrigation system	**Five from site three**
Cluster 4 (36)	
Mix crop & irrigation farming system	**Not selected**

Fourth cluster has been omitted from investigation list due to: Household in this group are not typical and representative

Nutrient fluxes(Part 2)

- Horizontal nutrient flows

  A crop production B animal production✗

Crop production: Assessment for

-quantities of agronomic inputs/per crop applied

-quantities of out put (NPKC)/per crop harvested

-All input used: Origin of the resource

Prices

(Buerkert et al.2005)

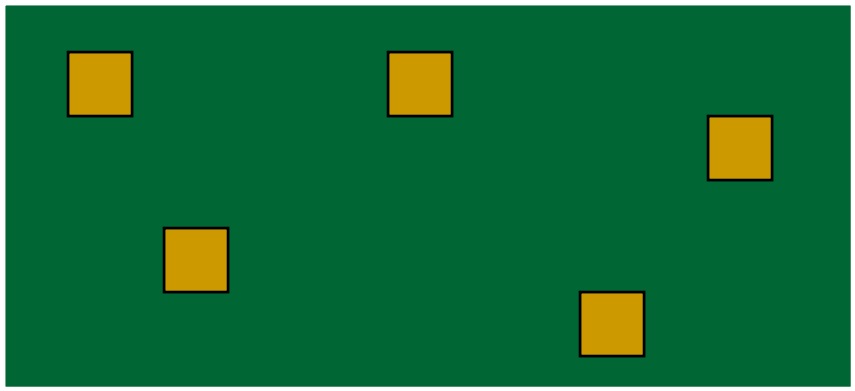
Horizontal fluxes

Irrigation source	HH Selected for Horizontal flux	Sampling units
Cluster 1	5	25
Cluster 2	5	25
Cluster 3	5	25
Total	15	75

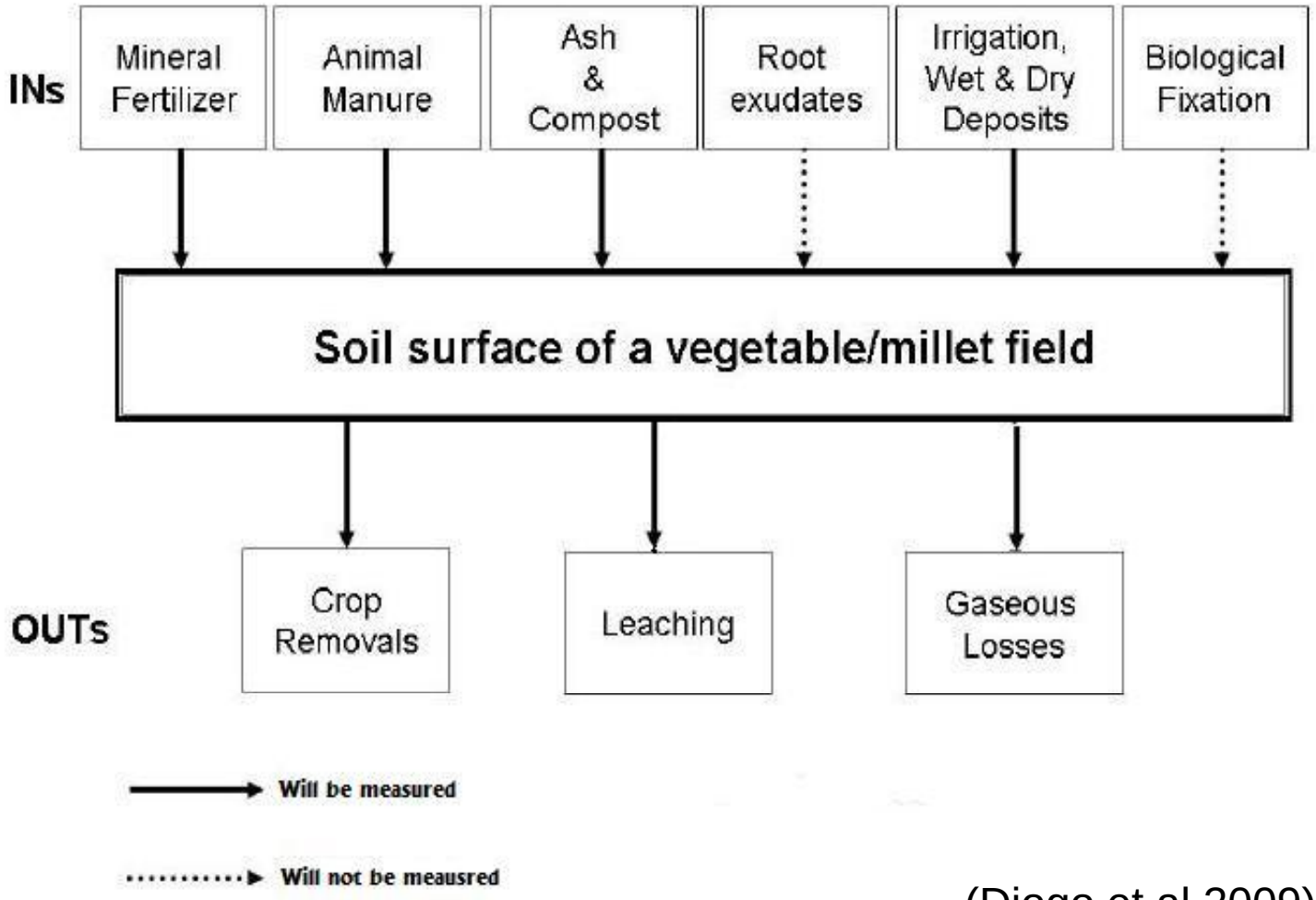
Inputs, rain,dust,fertilizer,irrigation water

Out put, crop harvested(dry matter basis)

Plot size 5x1m^2



Nutrient Fluxes Flow Diagram



(Diogo et al.2009)

Vertical nutrient losses (Part 3)

A Leaching

B gaseous emission

A-Nutrient Leaching losses

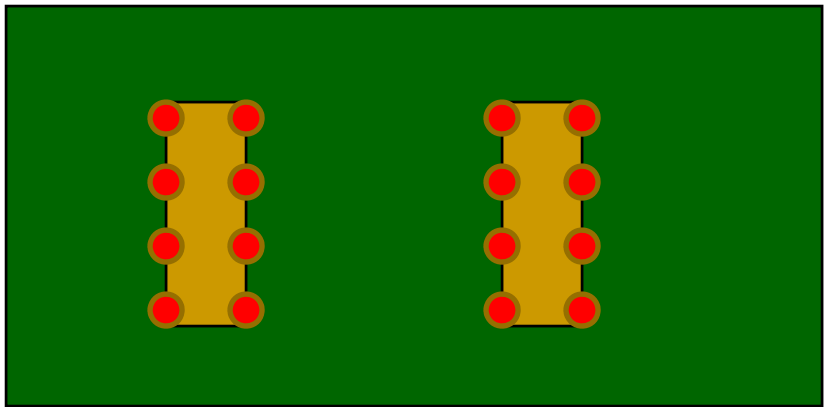
Mixture of cation / anion and sand (1 L c X 1 L a X 2 L sand)

Trenches up to 75 cm

Side cavities (20-25 cm)

Cartridges will be installed (16x3=48)

Replaced after each growing cycle (Predotova et al., 2009)



Vertical nutrient fluxes(continue)

B-Gaseous emission

Selection of representative farmer.

Use of (INNOVA 1312-5) gas emission instrument.

Measurement time 1-early morning 2- mid noon

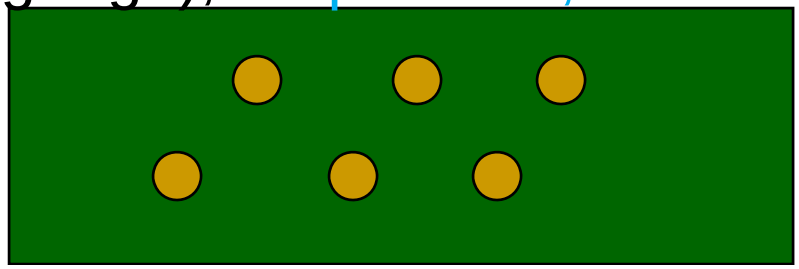
Data collection for CO_2, NH_3 , CH_4, N_2O

(Predotova et al., 2009; Hans et al., 2005)

Environmental Data collection

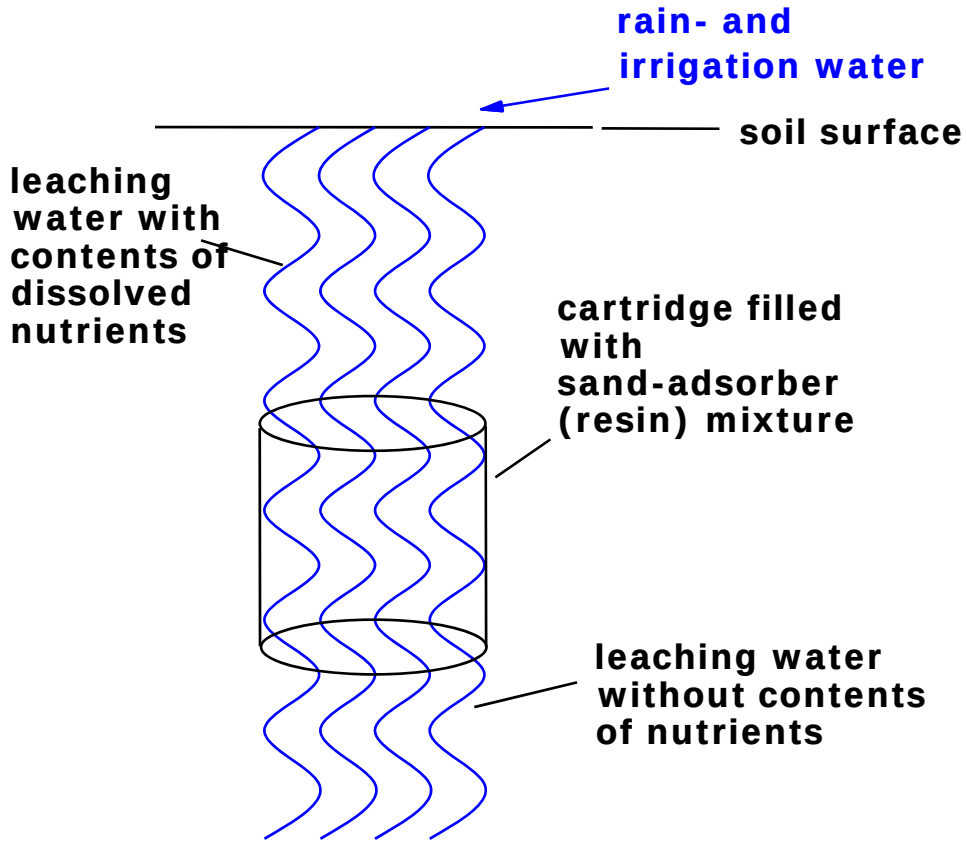
Ambient air temperature, humidity(HOBO)

Rainfall, (Rain gauge),Evaporation, Dust.



Leaching losses

The Self Integrated Accumulator (SIA) is a plastic cartridge filled with a mixture of strong basic and acid ion-exchange resins and silica sand.



Bottom-line

1-Infrstureture is developed and resources are available for potential production of vegetables

2-There is lack of management practices and proper utilization of resouces like fertilizer, Irrigation water and marketing channels.

3-This study will help improve sustainable production by utilizing available resouces.

4- Quantified nutrient input and out put will help improve:

Socio-economic status of farmers

Environmrnt amelioration

Thanks