Effect of Phosphorus and Plant Density on Floral Yield and Corm Production of *Crocus sativus*

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INTRODUCTION

- **BOTANICAL NAME:** *Crocus sativus*
- Saffron : to Iris family
- **ENGLISH NAME:** Saffron
- **LOCAL NAME:** Zafron
- **ORIGEN:** Khorasan, Mediterranean, Iraq, Crete and.
- **DISTRIBUTION:**
  - Asia (Iran, India)
  - Africa (Morocco)
  - Europe (Spain, Italy, Turkey and Greece)
  - America
Botanical description

- Fall flowering perennial plant
- Sterile triploid does not produced viable seed
- The crop propagated by corm multiplication
- Flower emerge in autumn
- Three yellow stamens which not produce viable spores
- One ovary with three stigmas which collected and called saffron
Flower has six petals
Saffron has not true stem
Leaves, sepal and flower bearing stalk is protected by a sheet
Leaf length is near to 40cm long
**Crocus sativus** needs hot and dry climate in summer and cold in winter

- Can be grown in mountainous climate
- Saffron plants need strong direct sunlight
- Saffron can be grown in arid territory with sandy soil, under hot and dry summers
- Plant tolerate cold winter up to -10 - 23°C and summer 40-45oC
- The recommended annual precipitation for *C sativus* is 600-700mm/year
- But it can also grow at 300-350 mm/year precipitation
- Due to this reason it is drought resistance
The optimum temperature during corms plantation is 20°C.

Crocuses grow best in friable, loose, low-density, well-watered, and well-drained clay-calcareous soils with high organic content.

Raised beds used.

Soil pH 5.8-7.8.

Corms are planted out during their dormant period.
Cultivation

- Raise bed
- Row to row distance 30cm
- Plant to plant distance 10-20cm
- Planting depth 15-20cm
- Healthy corms of 2.5cm diameter and 10gm weight should be selected for planting
Saffron corms sheet removed
Cultivation (continue)

- The sheaths of corms should be removed
- Drought resistance
- Avoided heavy irrigation
- Causes rotting of the corm during dormant stage.
Fertilizer applications

- Upon require less fertilizer
- But for better crop and maintain soil fertility
- 80 kg P/ha
- 30 kg K/ha
- 20 kg N/ha
- P affects the shape and color of flower
- K improves resistance against diseases.
- organic matter 40-50 kg/ha
Weed control

- Mechanical control of weeds
- The use of herbicides on the crop is not useful
- But Roundup® or Buster® in dormant stages
- Mulch or saw dust can be used
Diseases and pests

- Rabbits and rats
- Nematodes
- Upon diseases resistance But,
- Fungal and bacteria diseases (e.g. corm rots, leaf rusts etc)
Flower picking

- Bear flowering about 40 days after planting
- Hand picking
- Flowers are usually plucked daily in the morning after the dew has evaporated
Saffron flowers
- Saffron is obtained from the stigma of the flower.
- Stigma separated by hand daily.
Stigma drying

- The quality of saffron depend on drying method
- Stigma are dried in different methods
- Spanish method 110 oC for two minute
- French method 70 oC for 30 minutes.
Recent Spanish research shows drying in a hot air flow at 70°C for 6 minutes will give quality saffron. Slow drying gives a poor quality product. Brightness of color is aided by quick high temperature drying.
Ingredients

- Stigma of Saffron contain:
  - Fats
  - Mineral salts
  - Turpin (aroma due to turpin)
  - Picrocrocin (spice)
  - Picro crozinozoides
  - Crocin (color)
uses

- Medicine (cancer, anti depression, brain tonic, stomach tonic, diarrhea anti septic and women diseases)
- As a spice.
- As a color for food.
- As a dying for cloth.
- Aromatic (perfume).
- As ink.
- Ornamental
Price

- Saffron is the only plant product which purchase in gram
- Saffron prices at wholesale and retail rates range from US$500/pound to US$5000/pound
- Due to high price it is called gold plant
- Price depend on saffron quality
Objectives

- Alternative of poppy in Afghanistan
- Due to:
  - High rate.
  - More uses.
  - Low input cost:
    - Less fertilizer.
    - Low irrigation.
  - Adaptation to different climatic condition
  - Low range of disease incident
Objectives (continue)

- To observe the growth, development and production of *C. sativus* under the agro-climatic conditions of east provinces of Afghanistan.
- To find out the effect of P on flower yield, corm and cormel production of *C. sativus* (objective).
- To find out the effect of planting distance on flower (saffron) yield, corm and cormel production of *C. sativus*. 
Material and method

- **LOCATION:** Ornamental Horticulture nursery farm department of Horticulture NWFP Agricultural University Peshawar during October, 2005 – April, 2006.

- **COMPONENTS OF THE RESEARCH**

- **Two factors**
  - Phosphorus doses (NPK)
    - P1 = 10:0:20
    - P2 = 10:20:20
    - P3 = 10:40:20
    - P4 = 10:60:20
Methodology (continue)

- Densities
  - D1=5 cm
  - D2=10 cm
  - D3=15 cm
  - D4=20 cm
  - D5=25 cm
Parameters
DAYS TO SPROUTING
Days to flowering
Flower size
Flower /plant
Flower fresh
Flower dry weight
Stigma weight
Sprouts Number/Plant
Leaves number
Leaf length
Leaf fresh weight
Leaf area (cm²)
Leaf dry weight
No of corm/plant
Single cormel number
Single corm weight
Single cormel weight
Single corm diameter (cm)
Single cormel diameter
Corm volume
Economic importance

- Corm required for one hectare. 5 tons
- Saffron obtain from one hectare 5—10kg.
- Existing market price. $ 3000dollars/kg.
- Total income $15000-30000 dollars/hectare.
- Low irrigation drought resistance.
- Low fertilizer.
- Low culture practice (one year sowing for 3---5 years yields)
- Cost of corms $ 500/ tons or $ 2500
- Labor and other cultural practices cost.$2000 ( corm planting, flower plucking and stigma separation)
- Irrigation fertilizer and chemical cost $500.
- Total cost of production $.2500dollar
- Net income per hectare $. 10000---25000
Recommendations

- Phosphorus dose 20-40kg/ha should be used for better of crocus sativus.
- Distance between 10-15cm should be used for better floral yield and corm production.
- The following factors should be studied for the better production of crocus sativus:
  - Different planting dates.
  - Low pH
  - Different potassium and nitrogen doses.
  - Different light intensities.
  - Different drying and storage techniques.
  - Different picking and processing techniques.
THANKS
FROM
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