

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

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**Masood Sayed, Assistant Professor
Faculty of Agriculture, Kabul University**

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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

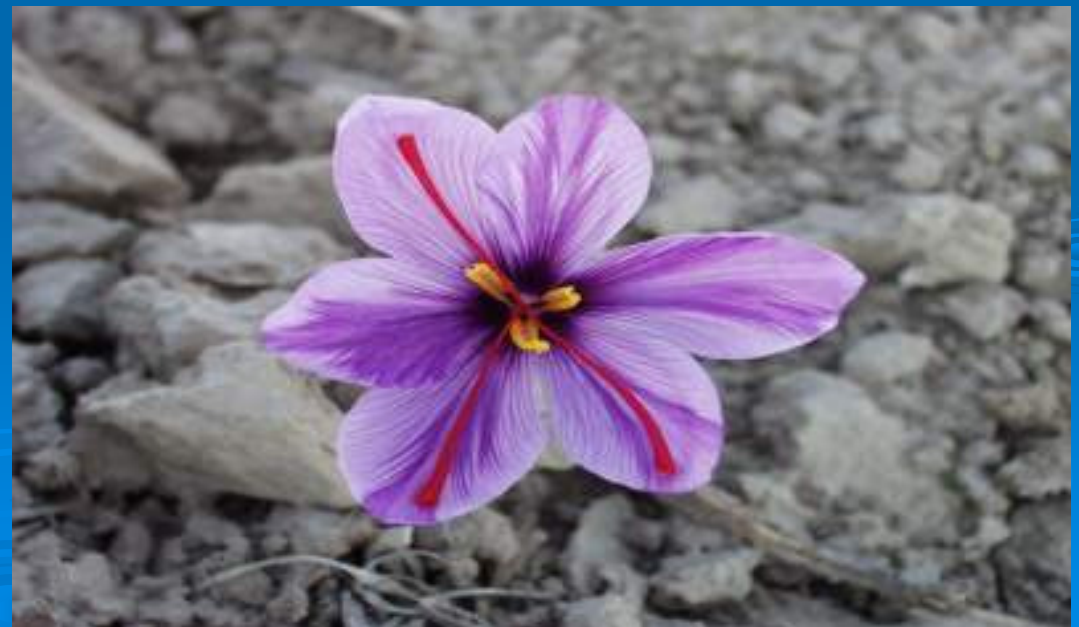
Botanical description

- 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



botanical discription(continue)

- Flower has six petals
- Saffron has not true stem
- Leaves ,sepal and flower bearing stalk is protected by a sheath
- Leaf length is near to 40cm long



Climate

- *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



Climate (continue)

- 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



Stigma removal

- Saffron is obtain 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.



Stigma drying (continue)

- Recent Spanish research shows drying in a hot air flow at 70 oC 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 dye 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=10cm**
 - **D3=15cm**
 - **D4=20cm**
 - **D5=25cm**



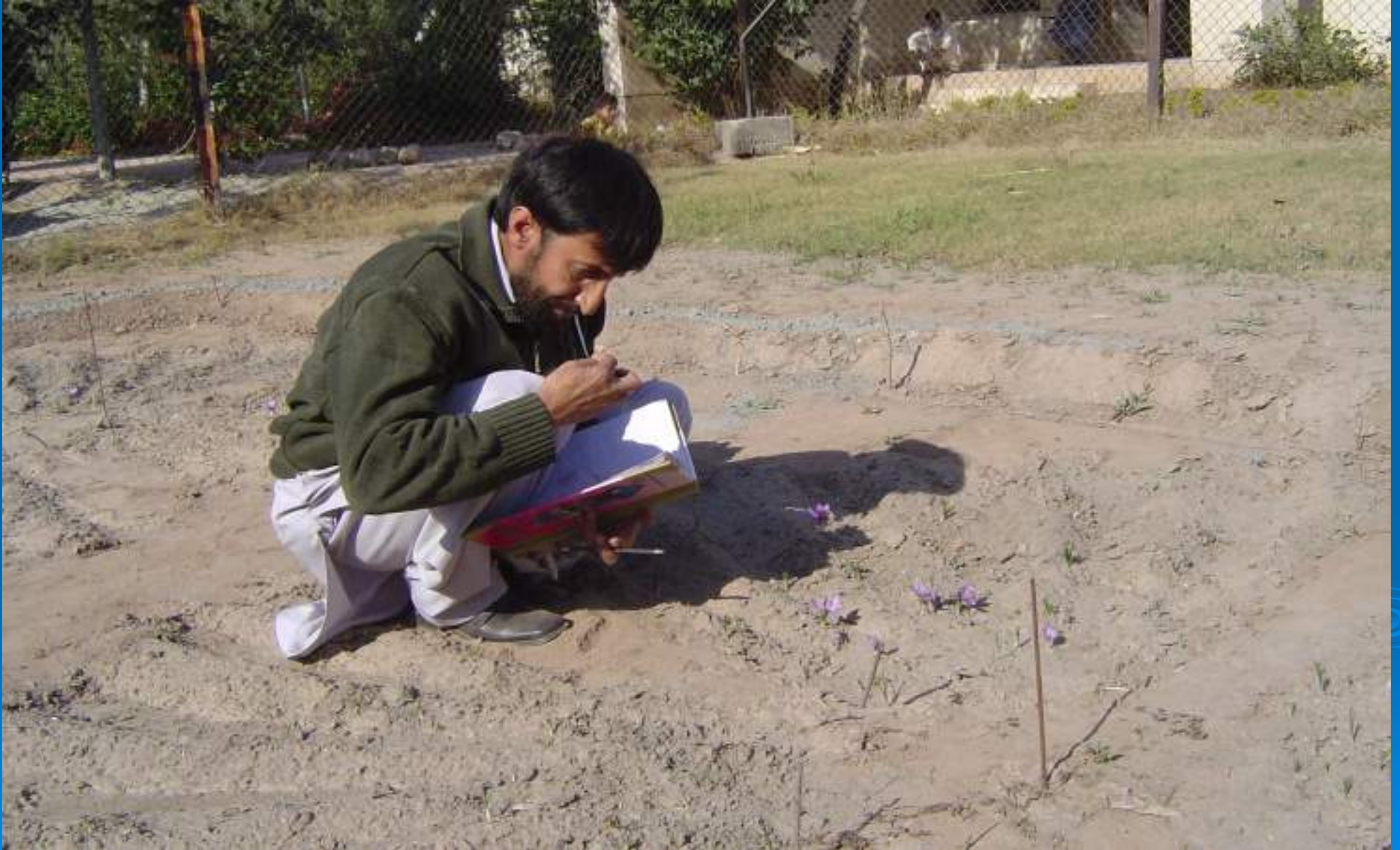
Parameters



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



Cormel 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 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
ICARDA AND DACCAR

