

SEX EXPRESSION IN CUCURBITS

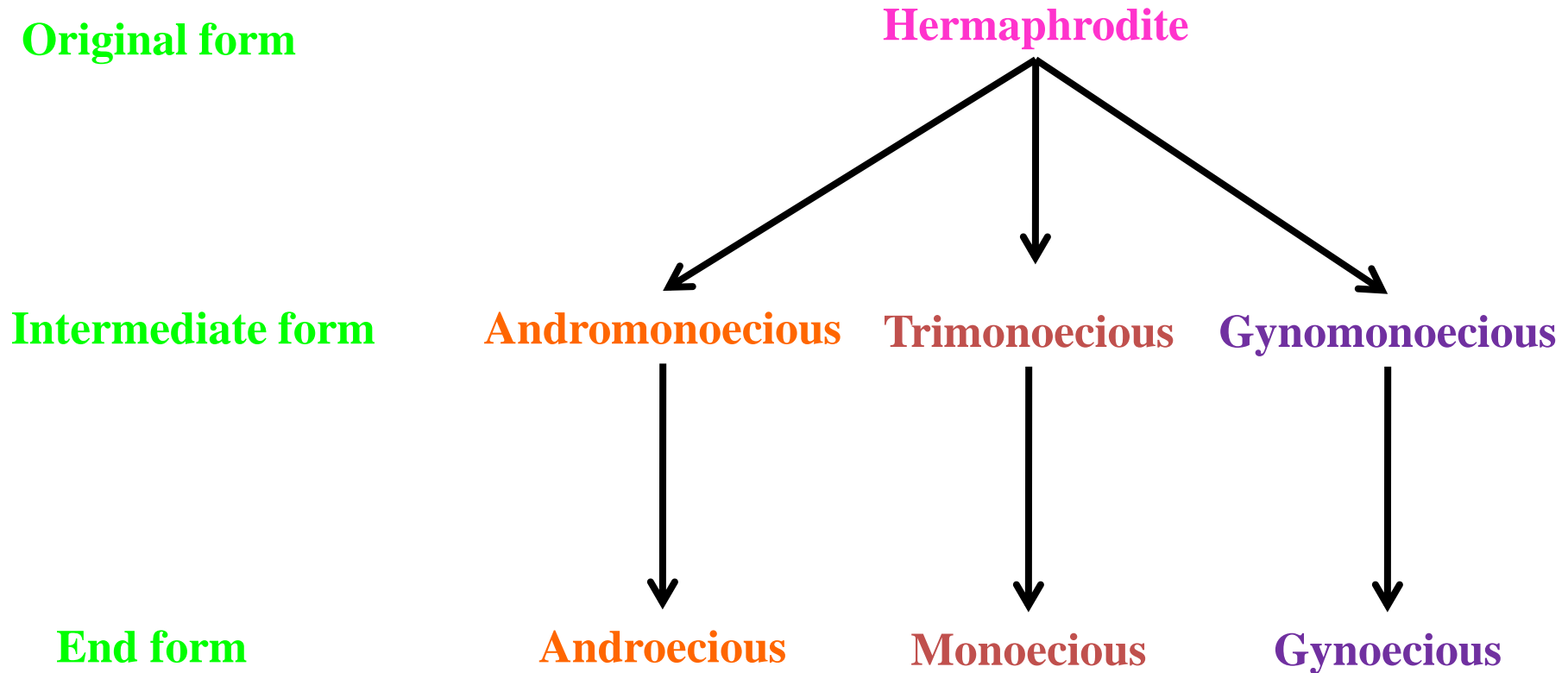
Introduction

- **Large and diverse group of vegetable crops under Cucurbitaceae family**
- **Cucurbitaceae consists of 90 genera & 750 species**
- **Variation in sex form hermaphrodite –monoecious (More, 2002)**
- **Sex determination genes control sex expression, although plant hormones as well as environmental factors can modulate (Meagher, 2007)**

Sex Forms in Cucurbits

SEX FORMS	CUCURBITS
Monoecious	Cucumber, Musk melon, Pumpkin, Summer squash, Winter squash, water melon, Sponge gourd, Round melon, Bottle gourd, Bitter gourd
Gynoecious	Cucumber, Bitter gourd, Musk melon, Watermelon, Ridge gourd
Androecious	Cucumber , Musk melon
Dioecious	Pointed gourd, Ivy gourd,
Andromonoecious	Water melon, Cucumber
Gynomonoecious	Cucumber, Musk melon, Ridge gourd
Trimonoecious	Cucumber
Hermaphrodite	Ridge gourd

Evolution of sex expression in Cucurbitaceae



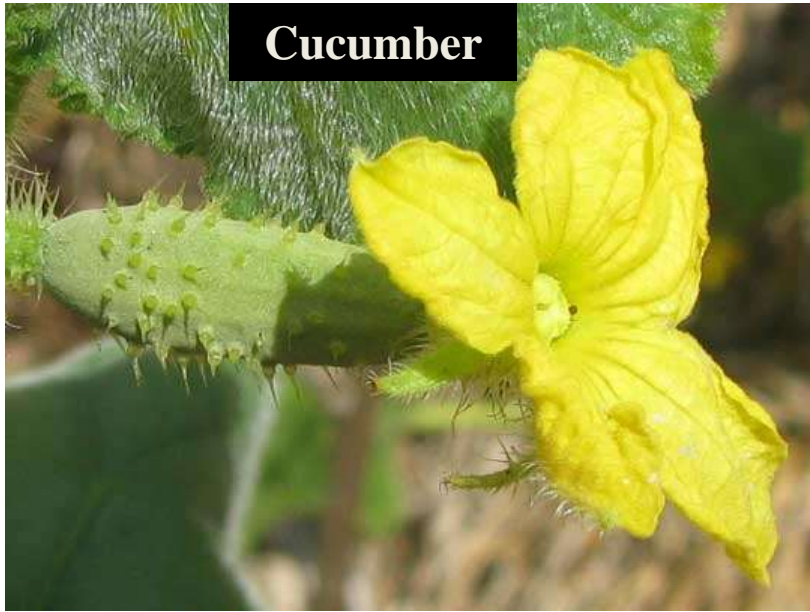
(Whitaker and Davis, 2008)



**Major
cucurbits**



Origin of gynoecism



Timeline of gynoecism

- First gynoecious lines in **cucumber** was reported by (Peterson and Anhder, 1960) in 'Shogoin' (PI 220860) Korean introduction
- Stable gynoecious lines in **muskmelon** (WI998) was developed from monoecious x hermaphrodite crosses by (Peterson *et al.*,1983)
- In **bitter gourd** gynoecious lines was reported (Ram *et al.*, 2002)
- Gynoecious lines in **watermelon** reported (Jiang and Liu, 2007)
- High pistillate flowers population in **sponge gourd** (Singh *et al.*, 2012)

Development

- **Chance segregate of gynomonocious**
- **Introduction gynocious lines**
- **Use of ethylene production as a marker**
- **Backcross breeding**

Flower sex phenotypes observed in gynoecious lines



Male

Female

Bisexual

(Manzano *et al.*, 2008)

Stability

- **Depends upon temperature and photoperiod**
- **Temperature $>30^{\circ}\text{C}$**
- **Photoperiod upto 12 hrs.**
- **Photoperiod had no influence under high temperature**
- **Same gene will show variation depend upon environmental background**

(More, 2002)

Interplay

Temperature



High

Low

Photoperiod



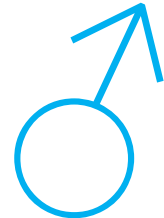
Long

Short

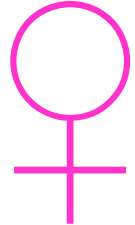
Shift



to



to



Chemical induction of staminate flowers

■ Silver nitrate (AgNO_3)

■ Silver thiosulphate [$\text{Ag}(\text{S}_2\text{O}_2)_2$]

Ethylene action blocker

■ Gibberellic acid (GA)

■ Aminoethoxy vinyl Glycine (AVG)

Biosynthesis blocker

■ Sib mating

Growth regulator sprays

◆ GA_3 10 - 25 ppm – ♀ ↑

◆ Two sprays → 2 leaf stage
→ 4 leaf stage

3 ppm of Mo
3 ppm of Boron
100 ppm of NAA
25 – 100 ppm MH

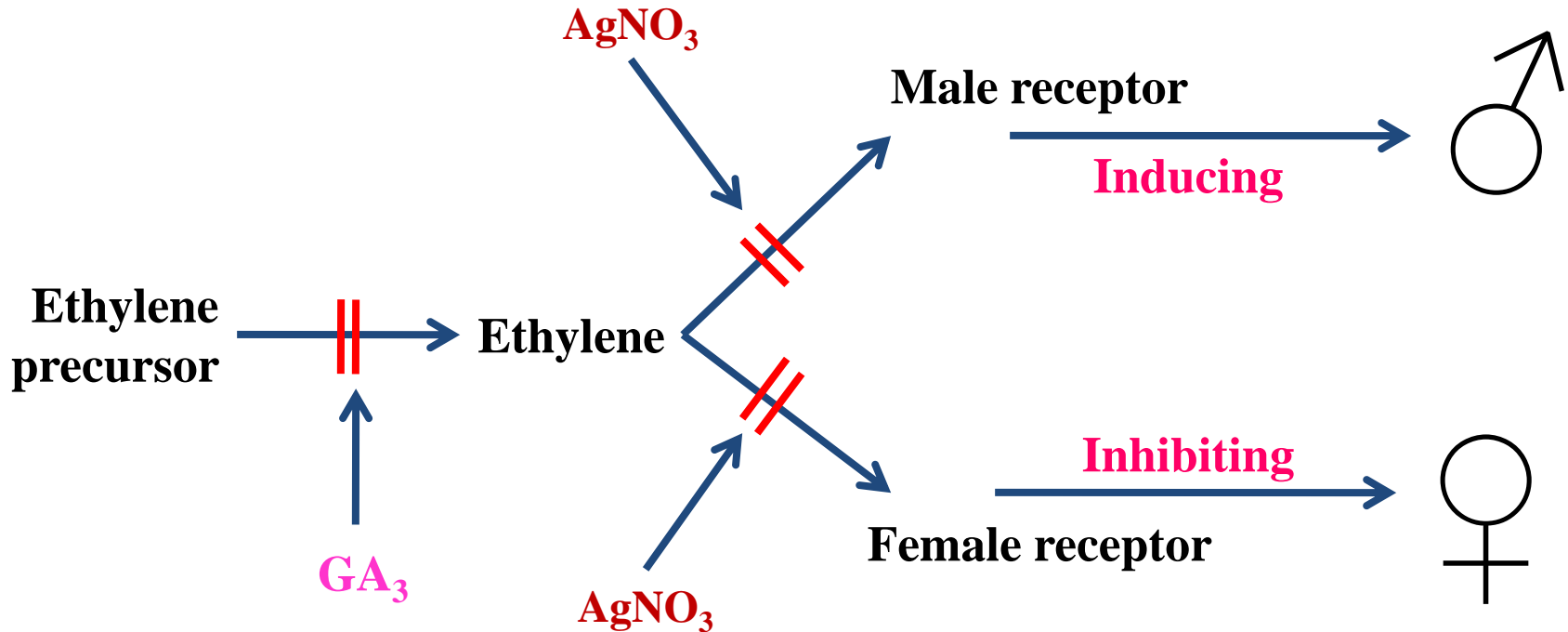


No. of ♂ flowers



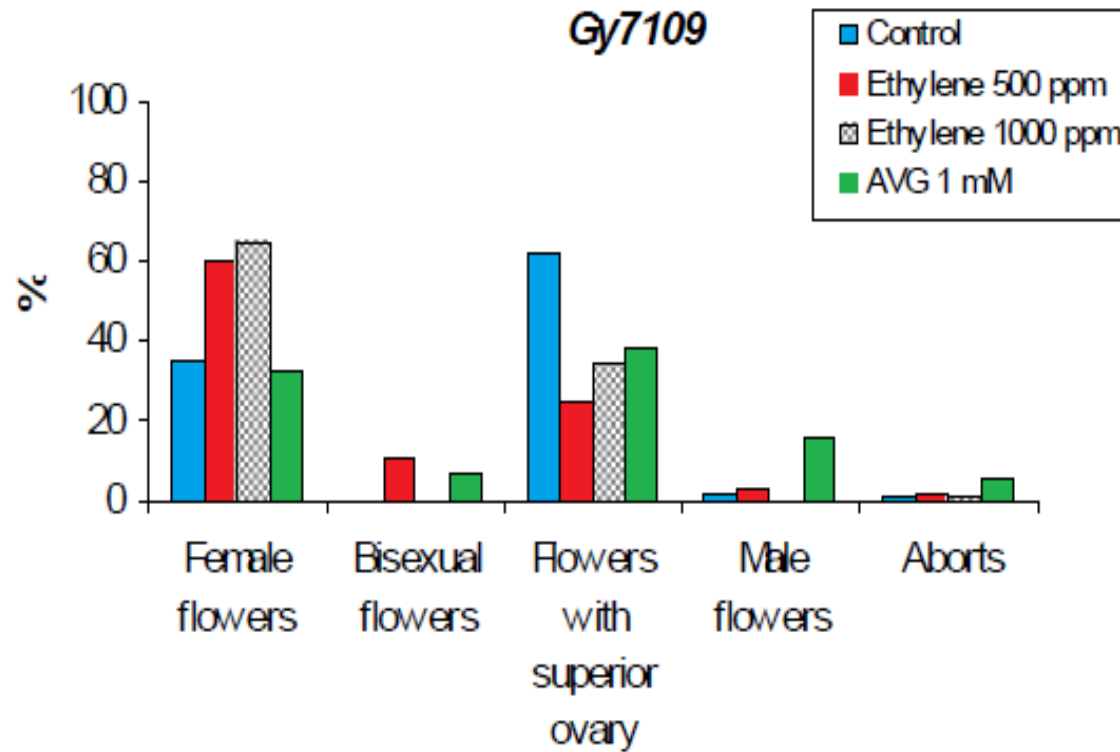
No. of ♀ flowers
fruit set
ultimate yields

Role of growth regulators



(Yin and Quinn, 1995)

Effect of ethylene spray



“Cucurbits-Everyone’s Crop”

THANK YOU

