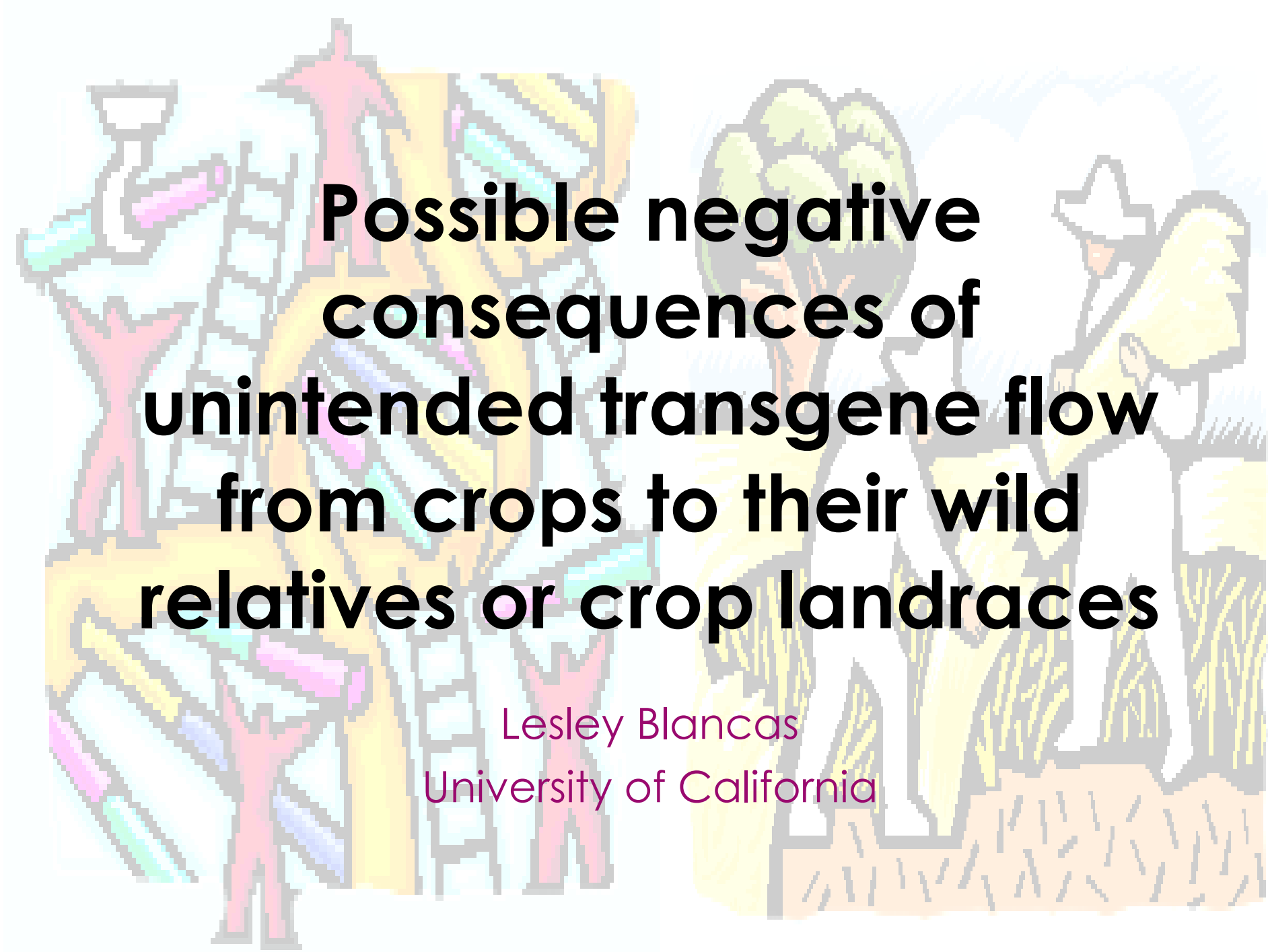

# Possible negative consequences of unintended transgene flow from crops to their wild relatives or crop landraces

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# General Risks of Unintended Gene Flow

## Vulnerability of Genetic Diversity

- Genetic assimilation or extinction
- Outbreeding depression
- Low or no population growth (indirect)

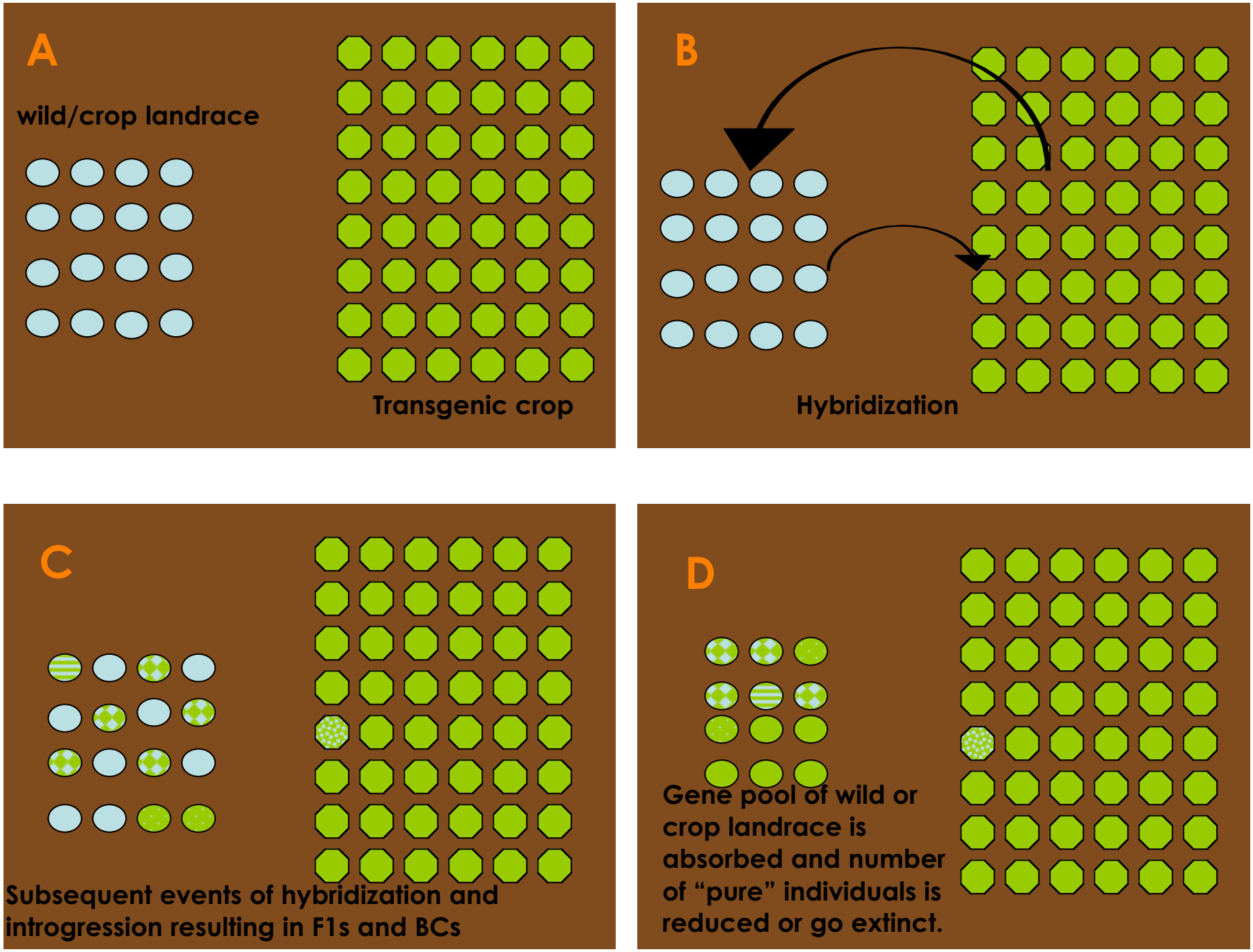
## Natural Invaders

- Aggressive weediness

## Ecological/Environmental

# Genetic Assimilation

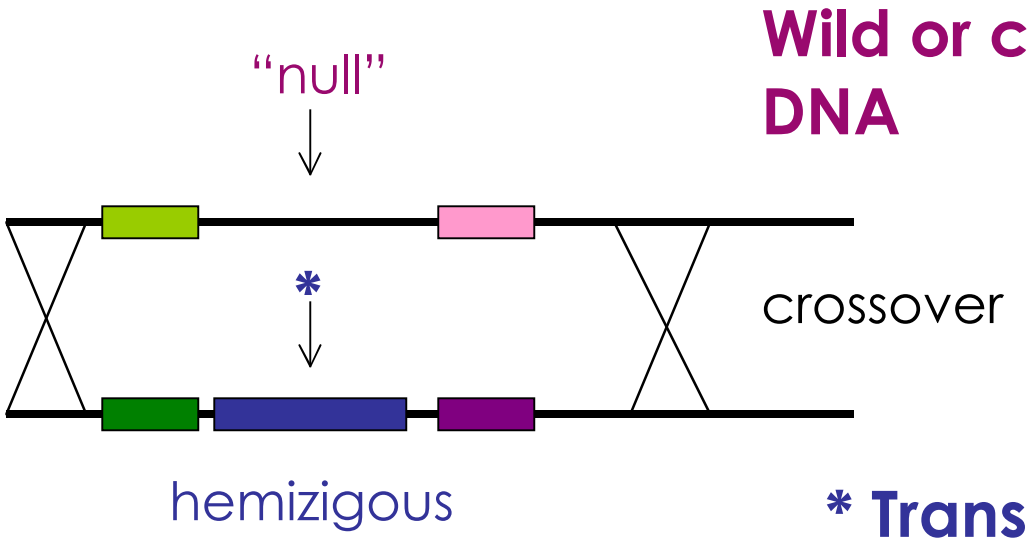
The genetic absorption of one species by another via hybridization and continued backcrossing to the recurrent parent until the rare plant seizes to exist


A
wild/crop landrace
Transgenic crop
B
Hybridization
C
Subsequent events of hybridization and introgression resulting in F1s and BCs
D
Gene pool of wild or crop landrace is absorbed and number of “pure” individuals is reduced or go extinct.

# Outbreeding Depression

## Low hybrid fitness, hybrid breakdown (inferior)

- A transgene is linked to crop alleles not advantageous in the wild (e.g.. loss of shattering seed, compromising the seed bank)
- In the case of crop landraces, the replacement of alleles that conferred an advantageous local adaptation (e.g. drought or fungal resistence)
- Low fertility due to divergent genomes, the extreme is sterility




**Wild or crop landrace DNA**

*** Transgenic construct flanked by alternate alleles**

Linkage disequilibrium between a crop allele and the favorable transgene can result in the loss of alleles advantageous to the wild species or in the local landrace

# Low or No Population Growth

Population growth rate of the wild species is compromised by mating with crop as… as an indirect expense to producing hybrid seed.

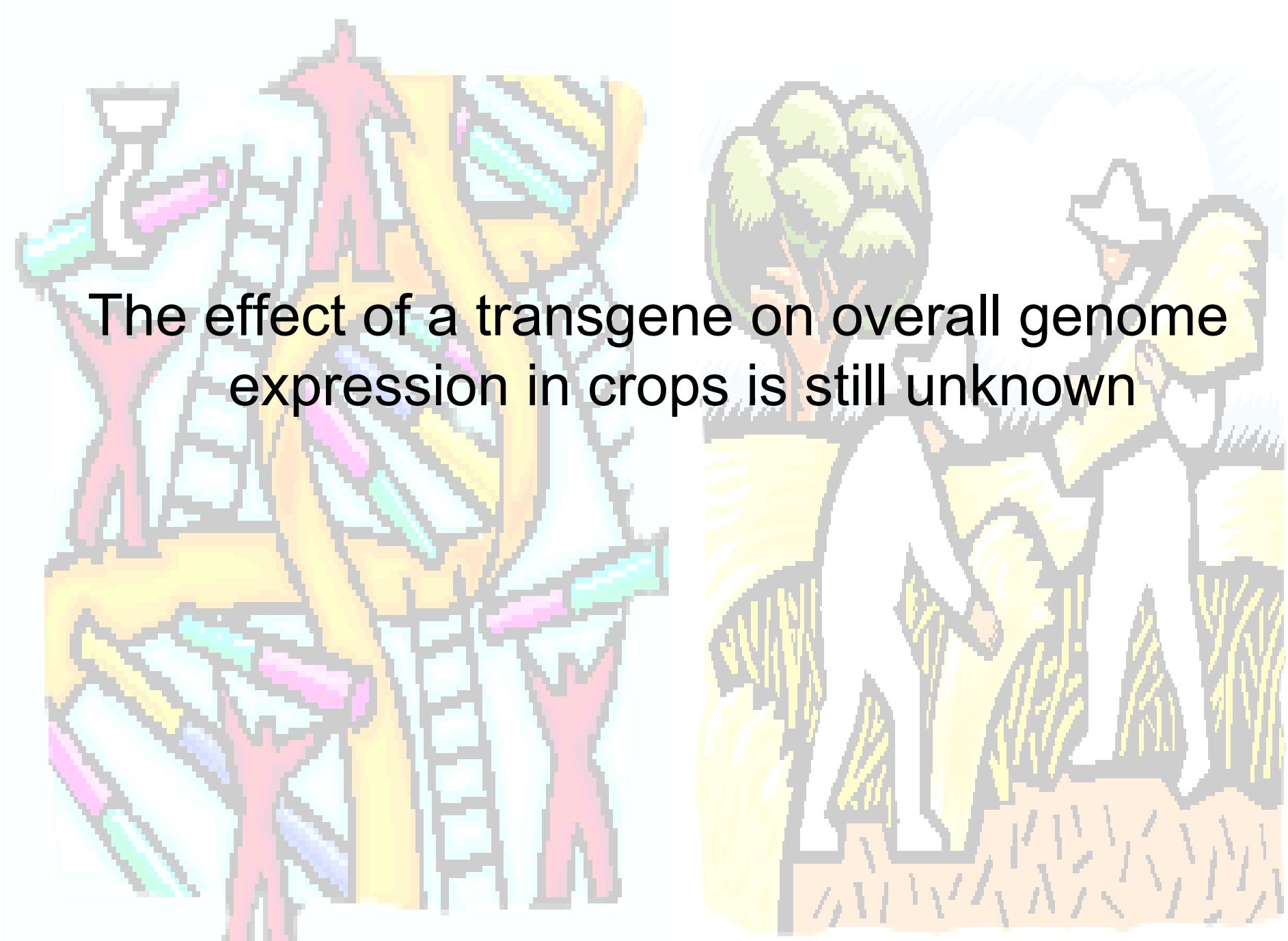
- Especially detrimental when there is hybrid breakdown or new reproductive barriers preventing backcrossing to the wild species

# Evolution of Weediness

- Higher fitness is the result of new adaptive advantage in the wild species with the transgene
  - New morphological or physiological change makes it better suited in cultivated fields, marginal or extreme habitats. Hybrid vigor. Results in successful colonizers.
  - Superweeds, successful colonizer and difficult to eradicate

# Ecological/Environmental

- Detrimental effects to non-target organisms related to wild populations or local landrace ecosystems (e.g. Lepidoptera species)
- Below ground ecosystems changes due to toxins released from root tissues
- Other by-products of transgenic plants into soil changing soil make-up, pH, etc.



The effect of a transgene on overall genome expression in crops is still unknown