The Crop of the Day

Strawberry

Sources

Fragaria, the crop (I)

- **Main production areas:**
  - temperate zones, some subtropical
  - Europe, USA, former USSR
- **Yields:**
  - seasonal variety: 10-13 t/ha
  - ever-bearing varieties: 50-100 t/ha
- **Plants:**
  - Perennial, herbaceous
  - Rosette of leaves, inflorescences, runners or stolons (= vegetative propagation)

Fragaria, the crop (II)

- **(False) Fruits:**
  - Enlarged fleshy receptacle
  - Growth stimulated by true fruits = achenes
- **Uses:**
  - fresh
  - processed: canning, jams, freezing, flavoring, confectionary
- **Nutrition:**
  - Highest content of all the berries in vit. C: 1/2 cup = 70% RDA
  - 1/2 cup = more fiber than one slice of whole wheat bread

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Fragaria, the genus

- Rosaceae
  - several 10s of species forming polyploid series: \(2n=2x\) to \(2n=8x\) (octoploids), with \(x = 7\); autopolyploid
- Distribution:
  - Europe and Americas: temperate and subarctic
- Reproduction:
  - wild polyploid: dioecious; cultivated: hermaphroditic, but cross-pollination is preferred for full seed set.
  - vegetative: "runners"
- Dispersal: seeds, by birds

Fragaria vesca - Wood strawberry, Fraise des Bois

- Diploid, \(2n=2x=14\)
- Monoecious
- Distribution: most common wild diploid
  - meadows, forest margins
  - temperate Eurasia, North America
- Archaeology:
  - Seeds from Neolithic, Roman, Medieval
- Cultivation:
  - Probably by Romans
  - In Renaissance: food, ornament, medicine (see herbals) --> larger fruits
  - Selection: larger fruits, longer-bearing; white-fruited (birds!)
  - Still widely planted for home use
**Fragaria moschata** - Musk or hautbois strawberry

- Hexaploid, 2n=6x=42
- Dioecious
- Distribution:
  - France, southern Europe, Russia, Siberia
- Incipient domestication:
  - Wallonia, Germany, France: 15th-17th century
  - Domestication arrested by introduction of the two following species from the Americas
  - Still grown for flavor and aroma; no increase in fruit size

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**Fragaria virginiana** - Virginia or scarlet strawberry

- Octoploid, 2n=8x=56
- Woods and meadows of North America, from East coast to Rocky Mountains and from New Mexico to Alaska
- Famous quote: from Roger Williams (1643): "...this berry is the wonder of all fruits growing naturally in these parts. It is of itself excellent so that one of the chiefest doctors of England was wont to say, that God could have made, but never did make a better berry. In some parts where the Indians have planted, I have many times seen as many as would fill a good ship, within few miles compass...."
- 1620s: cultivation in Europe:
  - selection of hermaphroditic cultivars
  - A few varieties still grown: unique flavor
Fragaria chiloensis - the Chilean strawberry

- Octoploid, 2n=8x=56
- Origin:
  - probably on Pacific coast (sand dunes) of North America
  - dispersal by migratory birds to Hawaii, southern Chile, Argentina: wild populations in Chile
- Domestication:
  - by Araucanians in Chile
  - planting runners, selection for larger fruits, different colors (red, yellow, white)
- Dispersal:
  - by Spaniards: during 16th-17th centuries in cool highlands of Latin America
  - by French (naval officer Frezier) around 1715: to Paris, 5 female plants
  - production in Brittany around 1750 by interplanting with F. moschata and F. virginiana (sources of pollen)

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Fragaria ananassa - the garden strawberry or pineapple strawberry

- Octoploid, 2n=2x=56
- Origin:
  - cross F. chiloensis x F. virginiana
  - combines larger fruit size of F.c. and hermaphroditism of F.v.
  - recognized by Antoine Nicolas Duchesne (1766): repeated the cross and grew progeny, which matched F. ananassa in appearance. His theory was only accepted in 20th century. He was well-ahead of his time not only because of his finding but also because of his methodology.
- History:
  - became main strawberry
  - additional diversity from California races of F. chiloense --> "everbearing" type, with greatly extended season
  - cross between F. ananassa and Rocky mountain race of F. virginiana (F. ovalis): drought, low temperatures
- F.v. and F.c. both donors of additional disease resistances

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Relationships among New World strawberries (Hokanson et al. 2006)

- N = 111 accessions; 5 SSRs

Reconstructing the modern strawberry

Reconstructing *Fragaria × ananassa* utilizing wild *F. virginiana* and *F. chiloensis*: inheritance of winter injury, photoperiod sensitivity, fruit size, female fertility and disease resistance in hybrid progenies

James J. Luby - James F. Hanoock - Adam Dale - Sedat Serçe

- “…substantial breeding progress can be made by reconstructing *F. x ananassa* if care is taken to select elite, complementary genotypes of *F. virginiana* and *F. chiloensis.*”
- Large fruit, high fertility, disease resistance, winter hardiness, photoperiod sensitivity, spring bloom date
More recently, the search for a better tasting strawberry

- 'Mara des Bois' strawberry: out of this world flavor! (photo P. Gepts)
- Developed by Marionnet, French breeding company
- Article in NY Times (April 13, 2005)

Some related sites of interest

- Strawberry as ground cover (from North Carolina State U.)
- California Strawberry Commission
- Oregon Strawberry Commission