VEGETABLE SEED PRODUCTION

Seed production

- U.S. vegetable seed production is located in the Pacific Northwest.
- Seed production is expensive and requires greater inputs and hand-labor.
- The economic return for the investment is also higher than for other crops.

Seed production areas

<table>
<thead>
<tr>
<th>Oregon</th>
<th>Washington</th>
<th>Idaho</th>
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<tbody>
<tr>
<td>Carrot</td>
<td>Carrot</td>
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<tr>
<td>Hybrid cabbage</td>
<td>Hybrid cabbage</td>
<td>Onion</td>
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<tr>
<td>Radish</td>
<td>Radish</td>
<td>Green bean</td>
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<tr>
<td>Onion</td>
<td>Onion</td>
<td>Hybrid sweet corn</td>
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<td>Leek</td>
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<td>Table beets</td>
<td>Dill</td>
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<td>Hybrid squash</td>
<td>Turnip</td>
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<td>Pumpkin</td>
<td>Kale</td>
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<td>Cucumber</td>
<td>Green bean</td>
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<tr>
<td>Parsley</td>
<td>Parsley</td>
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<tr>
<td>Turnip</td>
<td>Spinach</td>
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<td>Watermelon</td>
<td>Sugar beet</td>
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<td>Broccoli</td>
<td>Hybrid sweet corn</td>
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<td>Rutabaga</td>
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Seed Production

- OR – Willamette Valley, Treasure Valley, and near Madras.
- WA – Columbia Basin and Skagit River Valley
- ID – Treasure Valley and Snake River Valley.

Seed production

- According to harvest, vegetable seed production is divided into:
  - “Dry” seeds (e.g. onion, cabbage, carrot, sugarbeet, etc.)
  - “Wet” seeds (e.g. tomato, peppers, watermelon, eggplant, cucumber, squash, pumpkin)
  - Fleshy fruits which are dried before seed extraction (e.g. chilies and okra)
Seed production

“Dry” seeds
- Cutting the individual heads or inflorescence
- Cutting the entire plant
- Combine harvesting

“Wet” seeds and Fleshy fruits
- Use of specially designed machines or by hand
- Fruit maceration and separation of the seed from the pulp

Greenhouse tomatoes
- 65 – 75% of vegetable fruit production
- Seed production in greenhouses only limited.

Tomato seed production
- Produced the same way as tomatoes for canning.
- Raised beds 1.5 m wide and 20 cm high
- Land must be leveled for uniform furrow irrigation.
- Direct seeding or transplants
  - Direct seeding reduces cost
  - Greater flexibility of planting time and variety
- Crop rotation are necessary (soybeans, sugar beet, wheat, beans)
- Soil above 10 °C (optimum germination between 15 - 29 °C)
- Populations of 24,700 - 49,500 plants/ha (10,000 – 20,000 plants/acre)
Tomato seed production

- Manure applications in Fall (high organic matter requirements).
- Soil sandy, light and well drained.
- pH 6.0 – 6.5
- Needs N-P-K
- Mechanical and chemical insect and weed control.

Tomato seed production

- Harvest:
  - Mechanically or manually
  - Fruit fully ripe – physiological maturity
- Extraction:
  - Fruits in a crusher
  - Separate seed from gelatinous pulp by natural or chemical fermentation
  - Natural fermentation up to 3 days
  - Chemicals: hydrochloric acid or sodium carbonate

Tomato seed production

- Ratio 1 male:5 females
- Hand-emasculat-ion

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**Tomato seed production**

- **Conditioning:**
  - Airscreen cleaners

- **Storage:**
  - Cool, dry conditions
  - MC 6%
  - Can live 4-6 years

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**Tomato seeds**

- “Wet” seed – Pepper and Eggplant

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**Tomato seed production**

- 150-300 seeds/fruit
- 300,000 seeds/kilo
- 150-400 kg fruit = 1 kilo of seeds
- or 2.5 – 6 kg seed/ton fruit
- Yield: 250 - 400 kg/ha (220 – 350 lb/a)

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**Pepper and eggplant seed**

- **Harvest:**
  - Manually
  - Pepper seed a by-product of dehydrated pepper

- **Extraction:**
  - Fruits cut in two and shaken out
  - Seeds are washed and dried immediately
  - They should not be fermented
**Pepper seeds**

- Usually an annual crop
- Open-pollinated and Hybrids
- Self-pollinated, some cross-pollination
- Soil pH 6.0 to 6.5
- Sown directly or transplanted

**Pepper seed extraction**

- Wet without fermentation
- Dry after the fruit is dehydrated
- Hot peppers higher yielding than sweet peppers
- 1 kg of small hot peppers produced 25-100 grams of seed
- 100 to 200 kg seed/ha

**Cucurbitaceae seeds**

**Harvest**
Seed Extraction machine: Automatic extraction of seeds out of vegetable fruits like tomato, peppers etc.

Pumpkin seed extraction

Seed Drill: Extraction of seeds out of cucumber fruits, used at breeding stations

Seed Belt Extraction machine: Automatic extraction of seeds out of cucumbers and sweet peppers

Seed Rinsing and separating: after seed extraction separating of seeds from skins, pulp etc.

Drying
**Seed Dryer**
Conditioned seed dryer for larger seed lots, like tomato, pepper seeds etc.

**Temperature and humidity controlled process**

**Seed Box Dryers**
Conditioned drying in wooden boxes with high capacity.

**Your company name**
Conditioned box dryer, closed rooms, temperature and humidity controlled process.

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**Leek seeds**

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**Onion seed production**
- Soil friable, fertile, well drained
- Planted 75 cm between rows, 1-3 cm within the row
- Rate 4.5 – 6.7 kg per hectare
- Fertilize to obtain large bulbs before winter
- pH 6.0-6.5

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**Onion seed production**
- Vegetative growth:
  - Cool season crop
  - Biannual
  - First year — fleshy seeds arising from a small conical terminal stem (bulb)
- Reproductive:
  - Seed formation in Spring and early summer
  - Requires vernalization
Onion seed production

- **Seed**: Three sided 3 – 3.5 mm

Reproductive:
- Open-pollinated
- Insect pollinated (cutter and honey bees)
- Hybrid seed production ratio 2 male:8 female

Seeds
- Bulb to seed
- Seed to seed

Irrigation

- Weed and insect control

Harvesting, drying, and threshing
- Seed head harvested at 30% MC
- Hand-cut with 10-15 cm stem
- Heads transported inside bags
- Dried with forced air
- Yield: 560 – 784 kg/ha (open pollinated) or 336 – 1,120 kg/ha (hybrid)

Specialist in manufacturing seed processing equipment

- Seed Thresher: threshing of seeds out of plants, seed pods or seed heads
- Designed for stock (foundation) seed productions
- Option: drawer with rails for the seed
- Collecting containers

- Mobile Seed Thresher: threshing of seeds out of plants, seed pods or seed heads
- Seed Belt Thresher: threshing of seeds out of seed pods/heads, like onion, beans and cabbage

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**Onion seed production**

- **Conditioning:**
  - Some cases light seed is separated by floating
  - Time should not exceed 3 minutes
  - Spin dried to 12% or less
- **Storage:**
  - Seeds deteriorate rapidly
  - At 6% MC retain viability for 3 years

**Cabbage seed production**

- Biannual plant
- Cool-season crop
- Not photoperiod sensitive
- Head must be quartered with a knife to allow flowering
- Seed stalk 1 – 2 m in height
- Inflorescence starts flowering from bottom to top
Cabbage seed production

- **Harvesting:**
  - Siliques or pods with uneven maturity
  - By hand
  - Some open-pollinated varieties by machine
  - Windrowing
- **Conditioning:**
  - Air screen cleaners
- **Storage:**
  - Remains viable for 4-6 years. MC 6%

“Dry” seeds – Lettuce

Lettuce seed production

- Similar to cabbage
- Annual, cool-season crop
- Either long-day sensitive or day neutral
- Some varieties need deheading, slashing or quartering, or application of growth regulators

Spinach seeds

Spinach seeds

- Similar to cabbage
- Annual, cool-season crop
- Either long-day sensitive or day neutral
- Some varieties need deheading, slashing or quartering, or application of growth regulators

Seed Blower: used for air separation of small seed lots. For example breeding stations.
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Seed Air Separator: used for air separation of medium small seed lots.
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Seed Air Screen Machine: used for separating seeds from stones, dust and empty seeds.

Specialist in manufacturing seed processing equipment.