<table>
<thead>
<tr>
<th>Crop</th>
<th>Saturated</th>
<th>Mono unsaturated</th>
<th>PUFA</th>
<th>P/S</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Oleic</td>
<td>Linoleic</td>
<td>Linolenic</td>
</tr>
<tr>
<td>Linola</td>
<td>10</td>
<td>17</td>
<td>71</td>
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<tr>
<td>Safflower</td>
<td>10</td>
<td>14</td>
<td>76</td>
<td>Trace</td>
</tr>
<tr>
<td>Sunflower</td>
<td>12</td>
<td>16</td>
<td>71</td>
<td>Trace</td>
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<tr>
<td>Maize</td>
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<td>29</td>
<td>57</td>
<td>1</td>
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<tr>
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<td>23</td>
<td>54</td>
<td>8</td>
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<tr>
<td>Canola</td>
<td>7</td>
<td>61</td>
<td>21</td>
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</tr>
</tbody>
</table>

Lesson 9

**Niger**

*Guizotia abyssinica*

**Niger**

- An oil seed for poor soils and coarse texture
- It is the crop suits in soils wherein all other crops are not possible
  - Like Horsegram in the tropics
- It is a minor oil seed cultivated in smaller area of the world

**Importance of Niger**

- Primarily (75%) for oil extraction
- Also used as food including confectionaries (18%) in India
- It is feed to birds in western countries
  - Export value for India
- Plant is feed to sheep but only silage to cattle
- Cake is valuable cattle feed
- Seed contains 35-40% oil
- Oil is pale yellow with nutty taste and a pleasant odour
- Keeping quality is poor due to oxidative rancidity
  - Olieic acid 38%, Linoleic acid 52%
- Oil is used for
  - Culinary purpose
  - For anointing the body
  - Manufacture of paints and soft soaps
  - Lighting and lubrication
- Niger oil is a good absorbent of fragrance
  - Used in perfume industries
• Oil a substitute for sesame oil in pharmaceutical purpose
• Niger based agar medium
  – to distinguish *cryptococcus neoformans*, a fungus that causes a serious brain ailment

**Distribution and area of Niger in the world**

*Major countries:*
• World area is around 1.0 million ha
• India & Ethiopia posses the major area
  ■ In Ethiopia it is cultivated in water logged soils where most other crops fail to grow

*Other Countries:*
• Sudan, Uganda, Zaire, Tanzania, Malawi, Zimbabwe, Pak, West Indies, Nepal, Bhutan & Bangladesh

**Niger area in India (million ha & million t)**

<table>
<thead>
<tr>
<th>States</th>
<th>Area</th>
<th>Production</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP</td>
<td>0.20</td>
<td>0.043</td>
<td>0.215</td>
</tr>
<tr>
<td>Orissa</td>
<td>0.15</td>
<td>0.047</td>
<td>0.309</td>
</tr>
<tr>
<td>Maharrastra</td>
<td>0.06</td>
<td>0.019</td>
<td>0.280</td>
</tr>
<tr>
<td>Karnataka</td>
<td>0.04</td>
<td>0.008</td>
<td>0.182</td>
</tr>
<tr>
<td>All India</td>
<td>0.52</td>
<td>0.150</td>
<td>0.286</td>
</tr>
</tbody>
</table>

Other states which also cultivate niger are Bihar, AP, Assam & WB

**Origin**
• From the highlands of Ethiopia
• From Ethiopia migrated to East Africa
• During the beginning of 2nd millennium BC to India

**The Plant**
• Annual dicotyledonous herb
• Seedlings
  • Pale green to brownish hypocotyls and cotyledons
  • The cotyledons remain on the plant for long time
• First leaf is paired and small
• Successive leaves are larger and opposite
• Leaves are sessile, lanceolate
• Softly hairy on both surfaces
• Dark green is usual color
• But lower leaves pale yellow
  • The stem is usually round, smooth to slightly rough
• Approximately 1-2 cm diameter
• Can grow up to 1.5 m
• Stem are hallow and break easily
• Color is green to reddish green
• Moderately branched
  • The capitula are surrounded by leafy involucres bracts
• Outer bracts being leaf like
• Inner smaller and finally merges with flattened paleas
  • The fruit is achene, typical of the composite, small.
  • Seed is 3-5mm length and 1.5mm width, lanceolate in shape
  • The testa is hard, glossy, and usually black
• Normally 1000 seeds weighs 3-5g
• There are 15-30 seeds/head
  ■ Sometimes more with immature seeds

The Climate
• It is temperate region crop
• Adapted to semi-tropical
• Performance is better between 500 -1000m elevation though suits up to 2500m
• Moderate Temp during growth
  • 18-23°C
  • >30°C growth adversely affected
  • Indian strains are less affected by temp compared to Ethiopian
• Frost will kill the young plant
• 1000-1300 mm RF can be tolerated but not >2000mm
• Peak flowering should not coincide with heavy rain
  • High wind – seed shattering
• Tolerates excess moisture and drought

The soils
• On wide range of soils
• Light textured soil but well drained heavy soil is also suitable
• pH 5.2 – 7.3
• Can tolerate water logging
  • Under waterlogged soil it develops aerenchyma cells
• It can grow in saline but increased salinity
  • Flowering gets delayed
• It can under dry soil
  • but not a dry land crop

Management
• Field
  • It is small seed hence requires fine seed bed
• Season
  • Aug-Sep
  • After a Kharif crop or early Rabi
• Varieties
  • No 71
  • IGP 76
• Spacing & Seed rate
  • 5 to 8 kg
• Row width varies from
  - 20 to 30 cm
• Between plants
  - 10 or 15 cm
• Method of sowing
  - Most common is broadcasting
  - Drilling by seed drill is advanced and more useful
  - Depth of sowing 1-3 cm
• Seed treatment
  - With fungicides
  - Void mixing with fertilizers

**Nutrient management**
• Cultivated in poor soils with less input due to
  - Poor economy of the farmer
  - Poor economic return of the crop
• Response to fertilizers in rainfed is poor
• A schedule of
  - 20:20:0 is recommended
    - N in two splits, at sowing and 30 DAS
    - K is recommended in Karnataka @ 10 kg
  - 40:40:0 is recommended in Orissa

**Weed management**
• Niger grows rapidly and covers quickly the surface
• One or two weedings – sufficient
• Dodder (Cuscuta) infested areas are there (Orissa)
  - Cuscuta free seeds
  - Herbicide Chlorpropham G at dodder germination @ 4 kg/ha
  - Pronomide @ 2 kg/ha as pre-emergence soil treatment or as foliar spray 20 DAS

**Water management**
• Very rarely grown as irrigated in India
• Crop is sensitive to moisture stress at early stage
• Schedule according to soil and climate
• Further research needed in this area
• Check basin or border strip is ideal methods

**Maturity & harvest**
• Duration varies 80-145 days
• Delayed harvest leads to shattering
• Seeds are loose in head, hence over maturity leads to grain shattering (25%)
  - When the leaves dry up, harvest it
• Harvesting like gingelly,
  - When the bud moisture is 45-50%
• Stacking in the floor for a week and drying and cleaning, as usual

**Yield potential**
• Normally 300-500 kg but up to 1000 kg/ha
• When intercropped
Cropping systems
- Sequential cropping
  - Little millet or finger millet – Niger
- Intercropping
  - Niger + sunflower (4:2)
  - Niger + soybean (2:1)
  - Niger + peanut (2:2)
  - Niger + blackgram (3:3)
  - Niger + castor

Some more edible oil seeds

Oil Palm
*Elaeis guineensis*
- Originated in West Africa
  - But has planted successfully in tropical regions within 20 degrees of the equator
- An oil produced to 21.5 million t in 2000
- Area grows annually by 2%
- World's largest producer and exporter - Malaysia - 47%
- Indonesia is the second largest world producer -36%
- Both are expanding their palm oil production
- Both pulp and seed contains oil
  - Pulp contains 20%
  - Seed 1.6%

Simarouba
*Simarouba glauca*
- Paradise tree
- Edible oil 42% by seed and 65% kernel
- Introduced into India

Olive (*Elaeagnus angustifolia L.*)
- Olive oil is an oil derived from the fruit of the olive tree, which originated in the Mediterranean area.
- It has a very high content of monounsaturated fats.
- Nowadays, olives are ground to tiny bits, obtaining a paste that is mixed with water and processed by centrifugation, separating the oil from the pomace (the other remaining substances).
- Edible commercial olive oil can be divided into several categories according to its chemical characteristics and the production method:
  - Extra Virgin Olive Oil,
  - Virgin Olive Oil, and
• Olive Oil.
  • The first two, virgin olive oils, are obtained only by physical extraction from the fruits.
  • Non virgin olive oil is obtained by the chemical refining of a low-quality non-edible grade of virgin olive oil called "lampante" olive oil

**The list enlarges this way:**
- Corn oil
- Soybean oil
- Rice bran oil
- Coconut oil