

# Tropical Horticulture: Lecture 23

## Lecture 23 Oil Crops

World Production of Oils—30 billion lb./yr

### Annual Trade

- 10 billion lb. vegetable  
(soy, cotton, peanut, safflower, sesame, olive)
- 3 billion lb. palm oil
- 5 billion lb. industrial  
(flax, castor, rapeseed, tung, crambe)
- 2 billion lb. marine [whale, fish (herring)]
- 10 billion lb. animal fats (tallow, lard)



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### Annual Consumption of Fats in US

Dietary: 40 lb./person  
Industry: 60 lb./person

### Cooking

- Shortening: 100% fat
- Salad oils: 100% fat
- Emulsifiers: 50–100% fat
- Margarine: 80% fat
- Processed foods: 1–10% fat

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### Industrial

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|------------------|------------|
| Paints           | Varnishes  |
| Lacquers         | Plastics   |
| Synthetic fibers | Linoleum   |
| Oil cloth        | Lubricants |
| Hydraulic fluids | Soaps      |
| Resins           | Cosmetics  |
| Medicinals       |            |

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# Tropical Horticulture: Lecture 23

No. carbons (source)	No. double bonds				
	0	1	2	3	4
	Saturated	Mono-unsaturated	-----Polyunsaturated-----		
4 (butter)	butyric				
6	caproic				
8	caprylic				
10	capric				
12 (laural)	lauric				
14 (nutmeg)	myristic				
16 (palm)	palmitic	palmitoleic			
18 (tallow)	stearic	oleic	linoleic*	linolenic	
20	arachidic				arachidonic*

\*essential to human nutrition

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**Oil: Glycerides of Fatty Acids = glycerol + fatty acids**

**Oil—Liquid at room temperature**  
**Fat—Solid at room temperature**

Glycerol
Fatty acids
Triglycerols

**Wax: Fatty esters (fatty acid + alcohol)**  
**Liquid or solid at room temperature**  
**Carnuba wax—a palm in Brazil**  
**Jojoba wax—a substitute for sperm whale oil**

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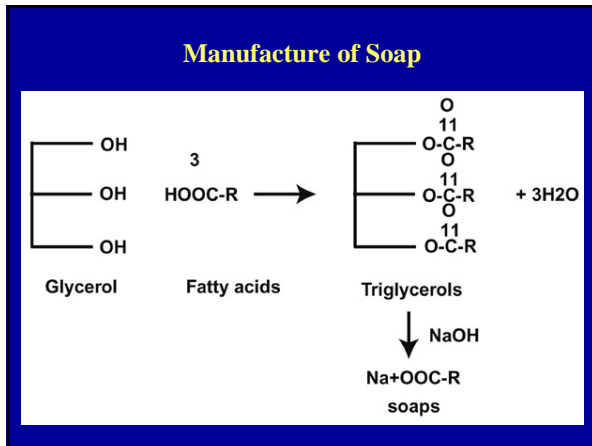
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### Fats in Nutrition

Provides calories  
 Fat = 9 kcal/g  
 Carbohydrates = 4 kcal/g  
 Protein = 4 kcal/g

Source of fat soluble vitamins: A,D,E,K

Provide essential fatty acids: linoleic, arachidonic

Saturated fats, trans fats, considered unhealthy.

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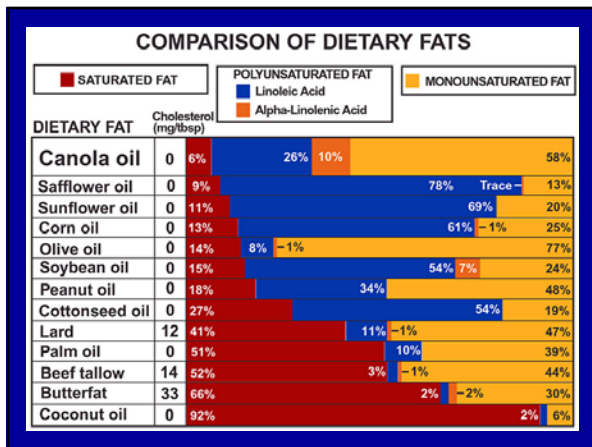
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**Oil Classification**

**Nondrying: remains liquid**  
**Semidrying**  
**Drying: forms films**

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**Nondrying Oils**

		
<b>Coconut</b>	<b>Palm kernel</b>	<b>Butter (saturated)</b>

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**Semidrying Oils**

		
<b>Soy</b>		<b>Cotton</b>
		
<b>Corn</b>	<b>Peanut</b>	<b>Safflower</b>

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### Drying Oils



Linseed      Rapeseed

Tung (polyunsaturated)      Castor

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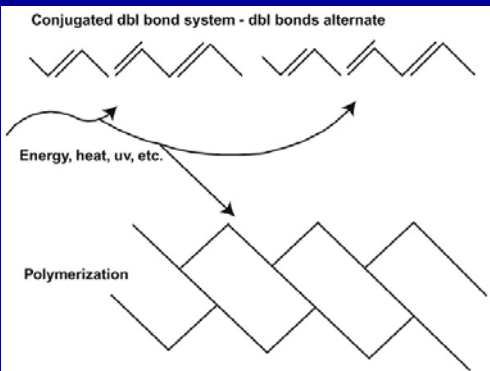
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### Polymerization

Conjugated dbl bond system - dbl bonds alternate



Energy, heat, uv, etc.

Polymerization

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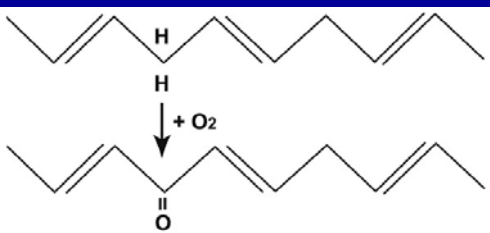
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### Rancidity



Addition of oxygen between double bonds results in compounds with off flavors. Prevented by the use of antioxidants.

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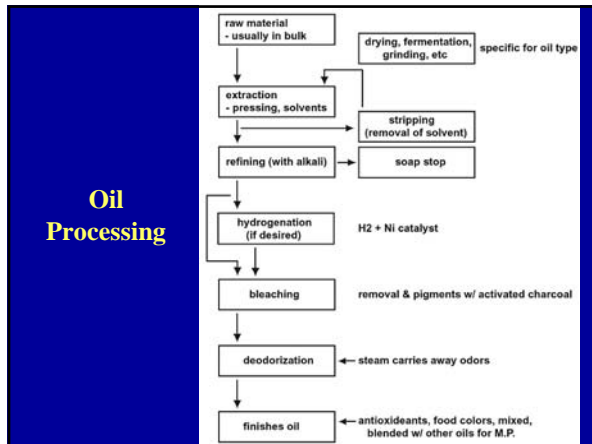
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