

# The Production and Marketing of GLA - Containing Oils

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# GLA - Containing Oils in Commercial Use

- 1) Evening Primrose (*Oenothera* spp.)
- 2) Borage (*Borago officinalis* L.)
- 3) Blackcurrant (*Ribes nigrum* L.)
- 4) Fungi (eg. *Mortierella*)

# Evening Primrose

- Most important commercial GLA source
- Originated in North America
- Now widespread in temperate regions
- Date of introduction in China?
- Harvested in China as 'wild sesame'
- First commercial crop for GLA in 1970 in England

# Life Cycle of the Evening Primrose

- Three possible sowing times:
  - Early autumn, overwinters as plants
  - Late autumn, starts growing in early spring
  - Spring, starts growing later in spring
- Flowers June - September
- Harvest September - October
  - Later sowing gives later harvest

# Agricultural Research on Evening Primrose

- Academic research from c. 1900
- Research on EP as crop started in 1973
- Still continues in UK and China
- Aim to improve:
  - Quality
  - Reliability
  - Yield

# Production in the West

For:

- Mechanised production
- Modern varieties

Against:

- High farm incomes from other crops
- Incomplete weed control
- High seed cleaning losses
- High prices

# Production of Evening Primrose in China

- Started exporting c. 1978 as 'wild sesame'
- Exports for GLA started c.1980
- First exports from wild harvest
- First crops grown 1996 onwards
- Now supplies mostly cultivated seed
- Wild seed still important in shortage years

# Production in China

- For
  - Low wage costs
  - Hand labour
  - Good climate and soils
- Against
  - Low quality
  - Difficult for Western buyers

# World Evening Primrose Supply

- Dominated by China (>90%) because of price
- Demand is steady and rising
- Supply is very variable year to year
- 5 to 7 year cycle of shortage and surplus
- Currently in shortage because of drought

# World Evening Primrose Demand

- Total quantity difficult to estimate
- No global data
- Secrecy about sales
- Total use probably 1 - 2,000 tonnes oil p.a.
- Mostly traded as oil, extracted in China

# Oil Extraction - 'Cold' Pressing

- Low capital cost
- OK when done well
- Risk from high temperatures (cis/trans)
- Risk of oxidation
- Low efficiency
- Need for refining

# Oil Extraction - Use of Solvent

- High efficiency
- Risk of solvent residues
- Use of low grade solvent
- Risk of high Peroxide & Anisidine values
- High capital cost
- Need for refining

# Oil Refining

- Cleans up oils after poor extraction...
  - ... but removes natural anti-oxidants
- Unrefined EPO has a very high level of anti-oxidants because of need to preserve wild seed in soil
- Gives good stability, even without vitamin E
- May increase effect in the body

# Optimum Strategy

- Solvent extract to get high yield
- Use gentle conditions to preserve quality
- Remove as much solvent as possible ( <2 ppm)
- Do not refine

# Markets for GLA Oils

- Health food
  - Largest market
  - Primarily soft gel capsules
  - New products are mixtures with
    - Fish oils
    - Vitamins
    - Herbal extracts

# Markets for GLA Oils

- Pharmaceutical
  - Evening Primrose only at present
  - Need licence
  - Big research investment
  - Currently for eczema and breast pain
  - Research on other diseases ongoing
  - Borage oil for concentrates

# Markets for GLA Oils

- Cosmetics
  - Creams, lotions, shampoo, soap
- Veterinary
  - Primarily cats and dogs
  - Some work on horses
  - Zoos

# Potential for Biotechnology

- Could produce GLA in major crop
  - eg. sunflower, soybean, canola
- GLA is produced by  $\Delta 6$ -desaturase
- Gene has been isolated from borage
- Transformed tobacco produces GLA
- Should be possible to transform oilseed crop
- Could reduce cost of GLA by 90%
- Will take 3 - 8 years to commercialisation

# Applications for Biotechnology

- May not be acceptable for health food
  - Evening primrose will remain dominant
- Use as pharmaceutical oil
- Use as source of GLA for concentration
  - Products based on high GLA %
  - Synthetic triglycerides
  - Combinatorial lipids
- Functional foods

# Market Predictions

- Health food market
  - Will continue to grow
  - Evening primrose will dominate
- Functional foods
  - New market
  - Potential for large growth
  - Initially evening primrose
  - Transformed oils as well later

# Market Predictions

- Pharmaceuticals
  - Potential for large growth
  - Natural oils will be replaced by concentrates
  - Raw material initially borage
  - Major use for transformed oils later

# Conclusion

The Future is Bright!