

Ian Beecher-Jones  
Drainage systems

# Drainage

Ian Beecher-Jones  
Soil & Water Management Centre

## Agenda

- History of drainage
- Current position
- Why drain?
- The future
- Help, my farm is under water

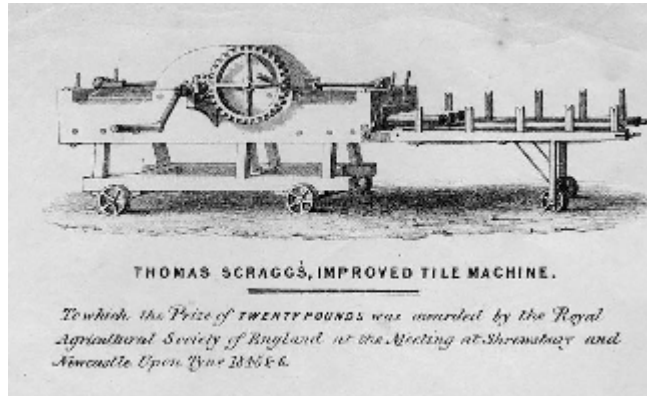


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## History of drainage

- How long have we been draining?
- 1845 – mass production of clay tiles

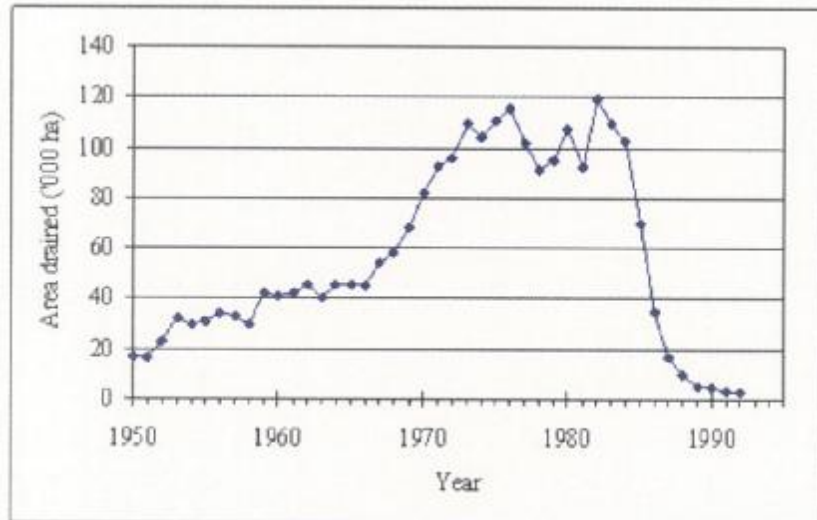


## History of drainage

- 1850 – 1880 - 2 million ha was drained through grant aided scheme
- £12million lent to farmers to drain (£12 billion today)

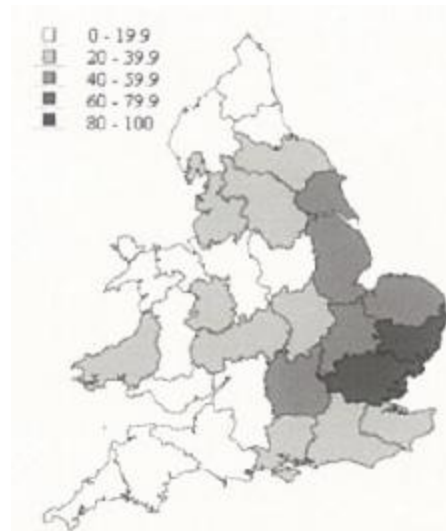


## Where are we now?



## MAFF county breakdown

- % of agricultural land area in each old MAFF Division that is drained by pipe drains installed in the period 1950 – 1992 by grant aid



## Time to fail?

- 20% in South East England
- 70% in the North of England
- Relying on schemes installed in the 19<sup>th</sup> century
- 1987 Chris Stansfield estimates that 50,000ha of drainage was ceasing to function each year
- 50% down to poor maintenance



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## To drain.....

- Increased yield potential



## To drain.....

- Increased yield potential
- Reduced costs



## To drain.....

- Increased yield potential
- Reduced costs
- Increased flexibility



## To drain.....

- Increased yield potential
- Reduced costs
- Increased flexibility
- Timeliness





## To drain....

- Increased yield potential
- Reduced costs
- Increased flexibility
- Timeliness
- Investment – increases land values



## Why are we not draining?

- Cost
- Out of sight, out of mind
- Short, medium and long term benefits?
- No requirement

## Quantifying yield benefit

- Limited information
- Experimental field drainage unit
  - Drainage research
  - Pipe sizes
  - Pipe spacing
- Canada
  - Crop insurance data
  - Drained v not drained land
  - 1979 – 1999 – yield increase of 38%



## Drainage costs

- Drainage cost - £2000 - £2,500 / ha (20m Centres)
- Yield increase of 22.5%
- Cost - £2250, wheat price of £200/tonne
- 6 year pay off
- £60/£70/ha over 30 years

### Tax situation

- Installation or repair?



## Ditching

- £300 / day
- Move water
- Talk to drainage contractor



## GPS

- Reliability
- Follow contours of the land



## Recycled aggregates

- Cheaper
- Magnets to clean
- Wash stone



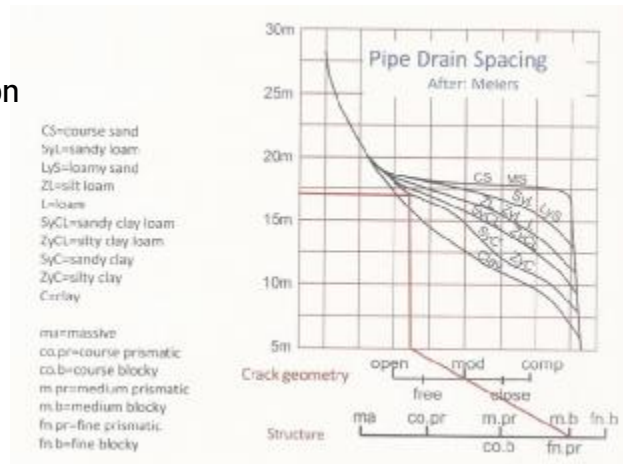
## Trenchless

- Skilled operator required
- Below old drains
- Speed is quicker

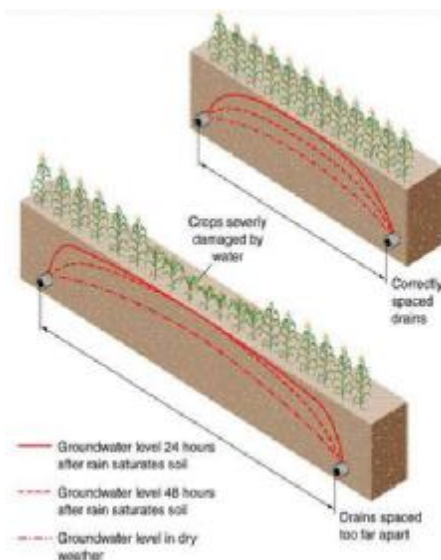


## Drainage Design

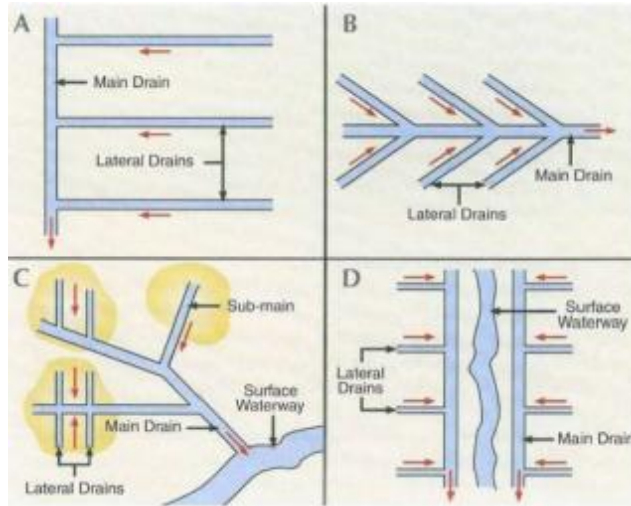
- Meiers M Charts
- Assessment of soil permeability
  - Soil texture
  - Soil structure
  - Soil compaction



## Drainage Design

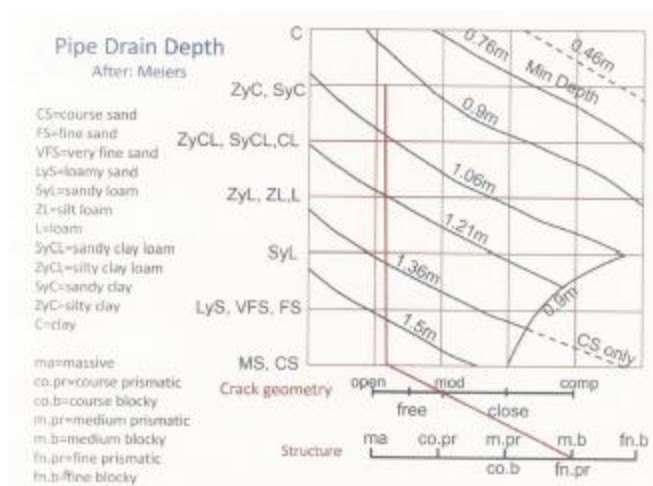


## Drainage Design



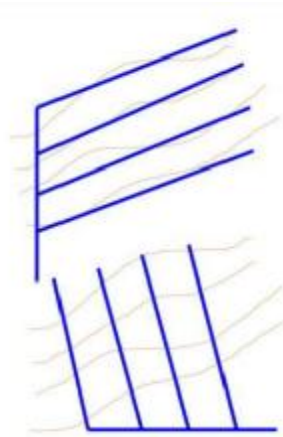
## Drainage Design

- Pipe drain depth

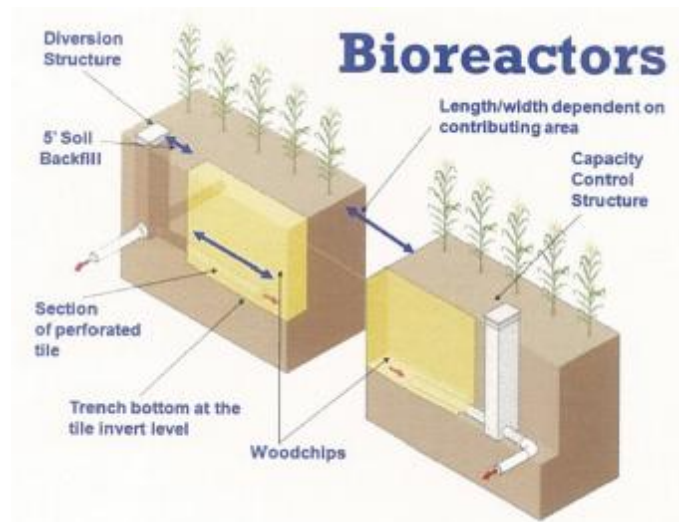


## Drainage Design

- Aligning laterals with contours



## The environment



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- Field management



- Record the wet areas, then quantify the problem



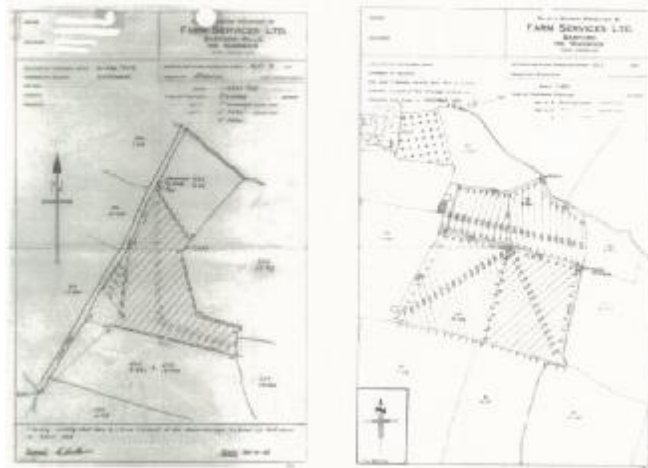
|                     | Min   | Max      | Avg     | Std Dev | Total       |
|---------------------|-------|----------|---------|---------|-------------|
| Capex Paves         | 3.3   | 1,213.3  | 60.1    | 214.7   | 243,270.4   |
| Flow Wheel (w/abod) | 3.2   | 15.6     | 7.8     | 4.8     | 2,340.0     |
| Fuel Economy        | 3.6   | 24.7     | 5.9     | 2.2     | 3,595.6     |
| Fuel Used           | 14.4  | 48.6     | 22.7    | 5.5     | 13,200.3    |
| Reading             | 3.0   | 256.8    | 10.3    | 9.8     | 73,244.0    |
| Wheat Yield         | 283.6 | 25,114.4 | 3,502.4 | 4,762.8 | 3,888,544.0 |
| Wetness             | 12.1  | 2.4      | 15.8    | 1.1     | 5,322.6     |
| Speed               | 1.0   | 5.3      | 2.3     | 0.8     | 1,467.3     |





## Completion plans

- Existing infrastructure, make sure it works
- Can anything be added?



## What can I do?

- Walk ditches – keep them clean
- Subsoil & mole drain in drier conditions, if correct soil type
- Clean current drains



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