



PlantPlan Genetics





How do I realise I have gain?

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A creative tension

Realised gain trials are a diversion of resources from breeding.

VS

I won't invest in your breeding program unless you can show me the gains.

- **Can we serve both masters?**



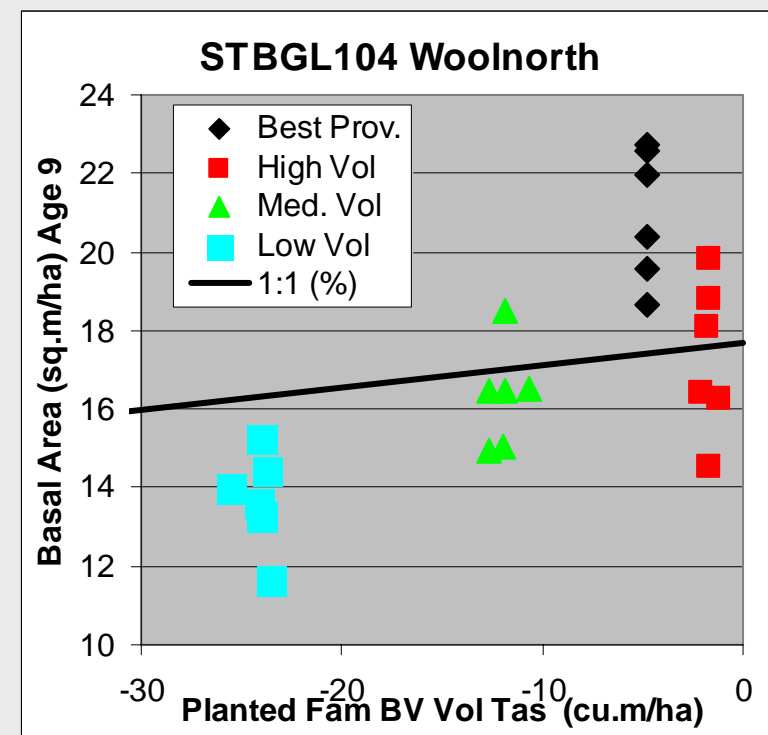
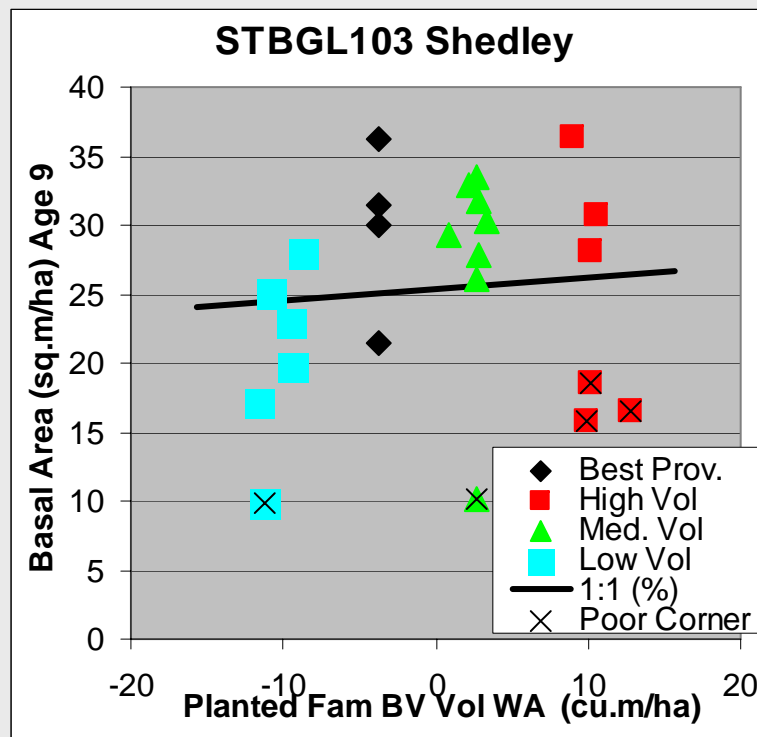
Why realised gain trials?

- **Demonstrate that breeding works**
- **Demonstrate progress in the breeding population**
- **Calibrate predicted gains from progeny trials against those achieved in plantations so that unbiased predictions can be made.**
- **Test deployment options for STBA and other germplasm**
- **Produce no extra gain**



Volume Calibration

- Large plots known (or estimable) BV = CP
- Uniformity and sufficient replication
- Maybe under-predicted for *E. globulus*?

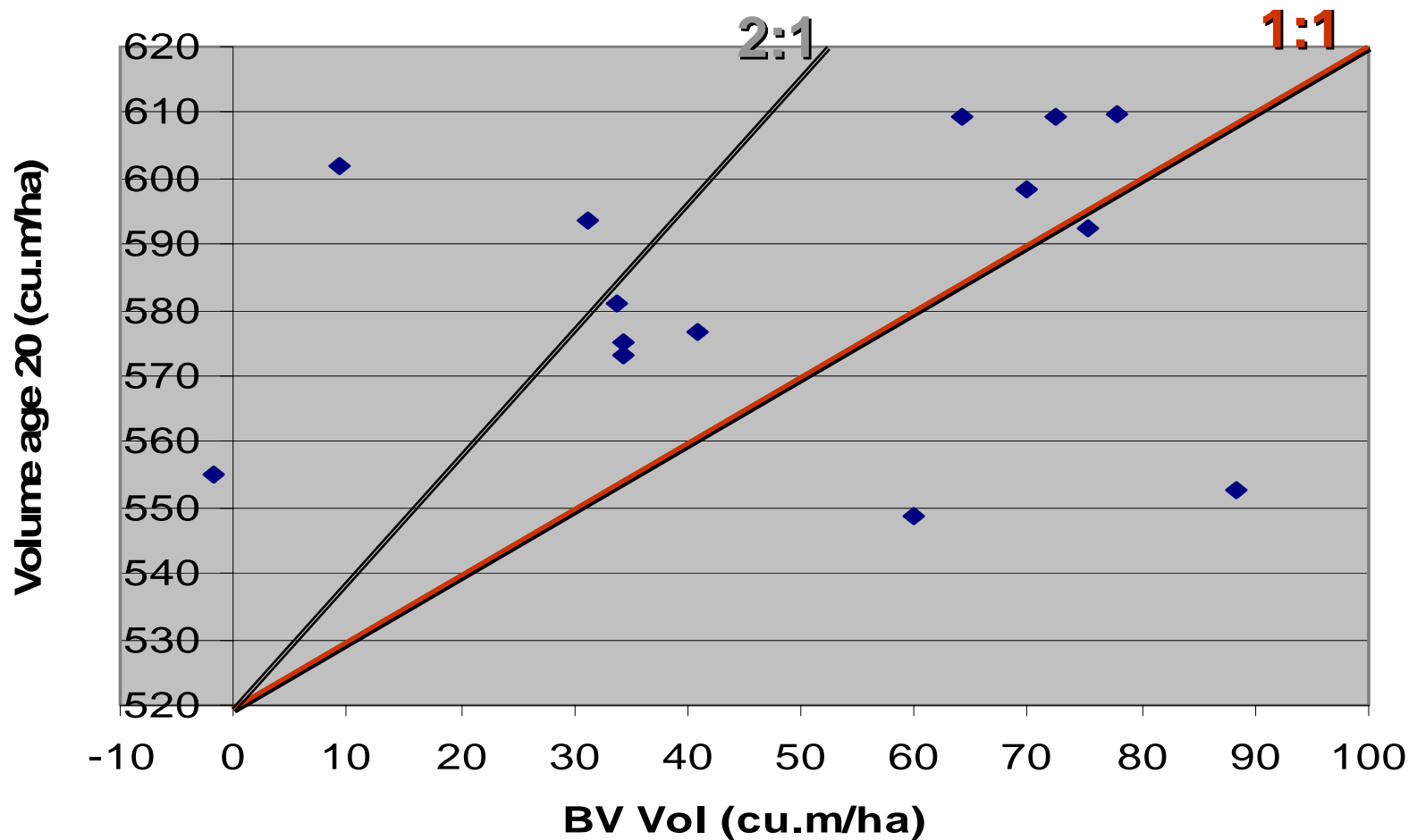




Volume Calibration

Gain at 20 yrs/500m³/ha predicted from age 10 BA.

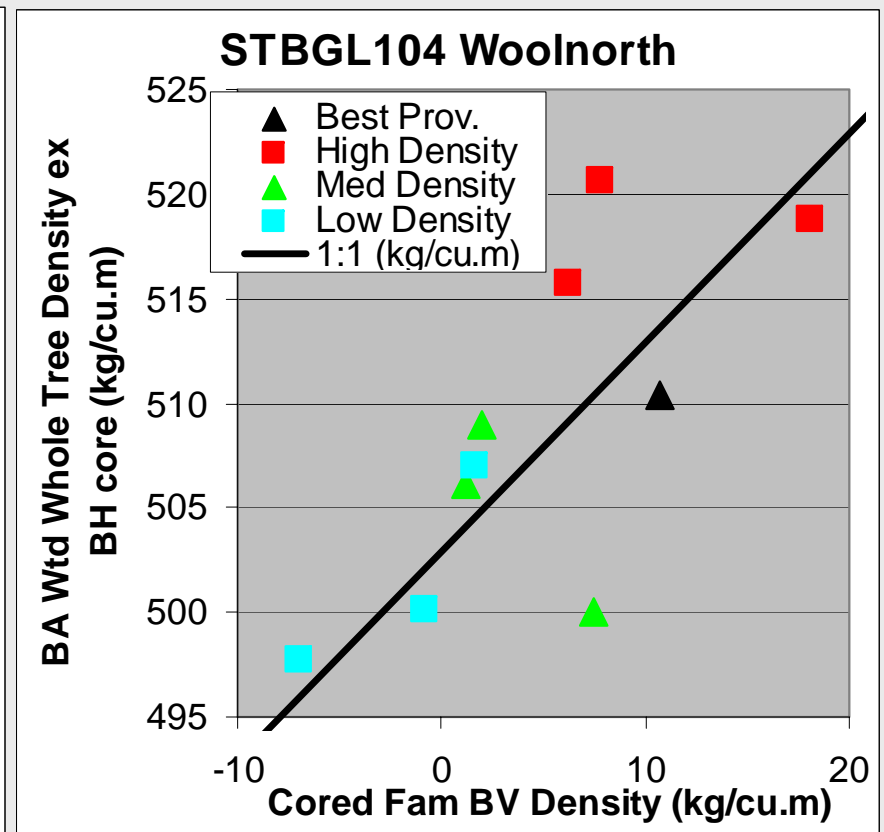
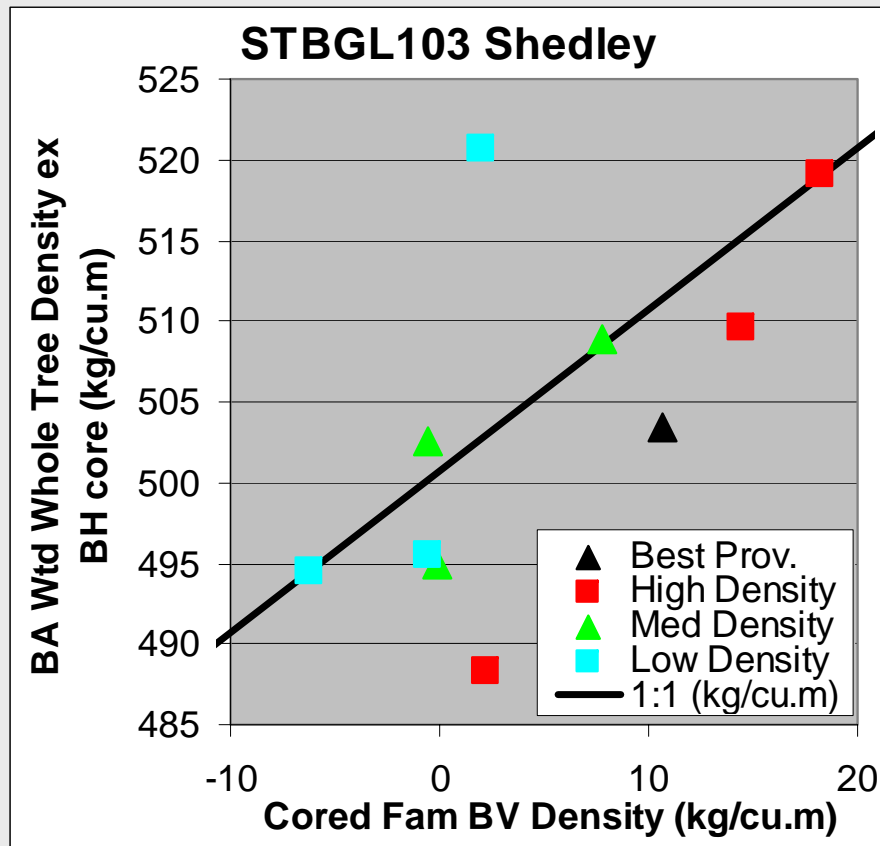
Pinus radiata under-predicted?





Density easy!

- No competitive interactions





Can we predict volume?

- **Volume/ha still most important trait**
- **Can't measure it in progeny trials**
- **Measure individual tree**
 - **Growth**
 - **Survival**
 - **Health/Resistance**
- **Competitive interactions mean integration is not easy**
- **Predict using Schneeburger**
- **Correlations and variances?**

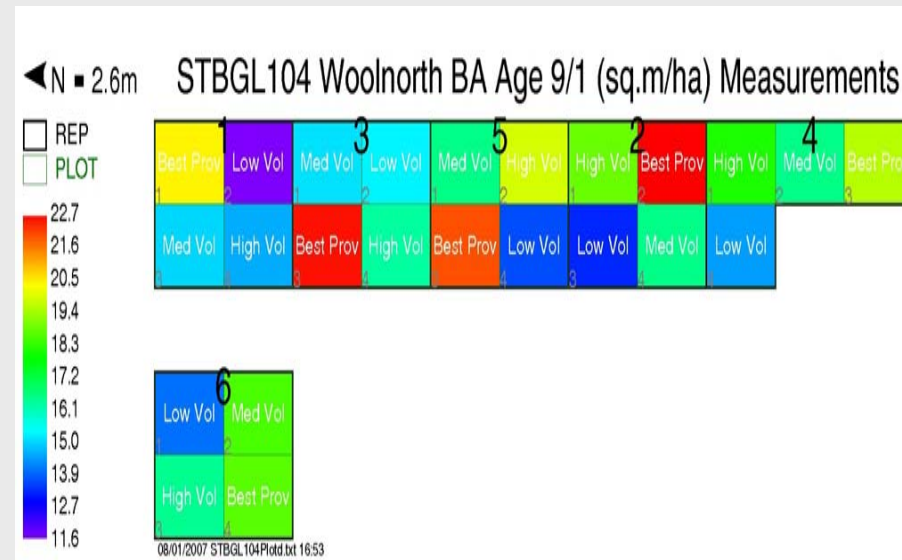
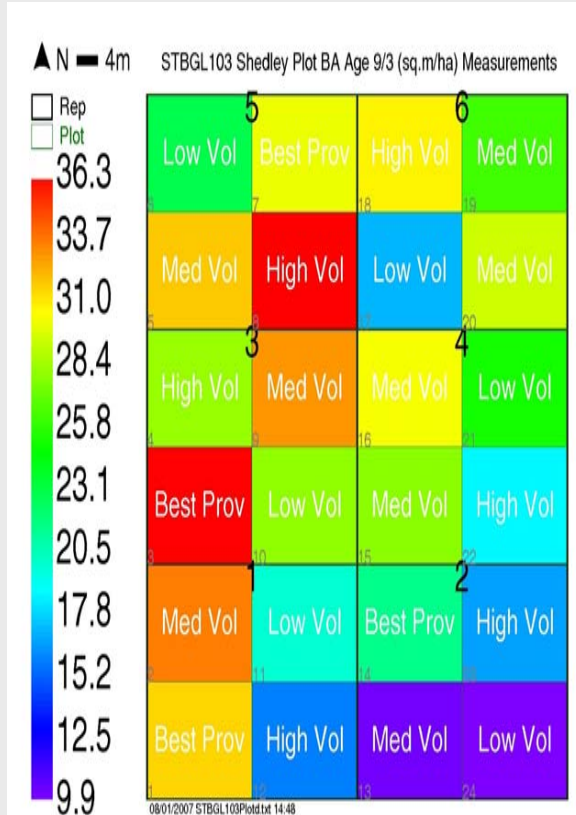


Other considerations

- **Visually and statistically compelling**
- **Competitive interactions not so important for other traits**
- **Usually out of date**
- **Large plots needed, but site uniformity hard**
- **Small plots exacerbate competitive interactions**
- **Clone/Family plots not representative**
- **Deployment may not reflect BV**



Large plots cause a problem





Possible treatment types

- Progeny testing
- Controls
 - Base OP
 - Generation based CP
- Supplier seedlots
- Progeny testing CP mixes
- Generational CP mixes
- CP families
- Cloned individuals



— Each PT an RG!

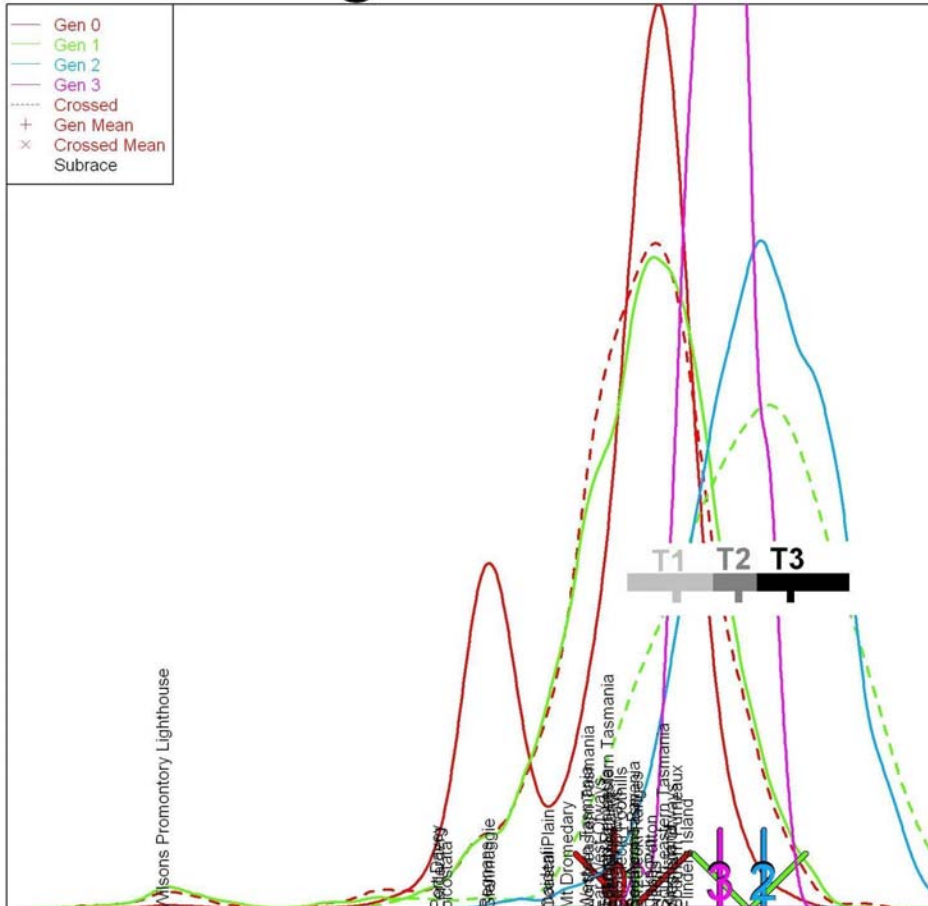
- Multiple trait selection
- Variation in growth in BP
- Have major plots for Volume BV
- STP for families
- Lots of replication
- Reduce competitive interactions
- Plenty of data for calibration
- Augment with other treatments periodically



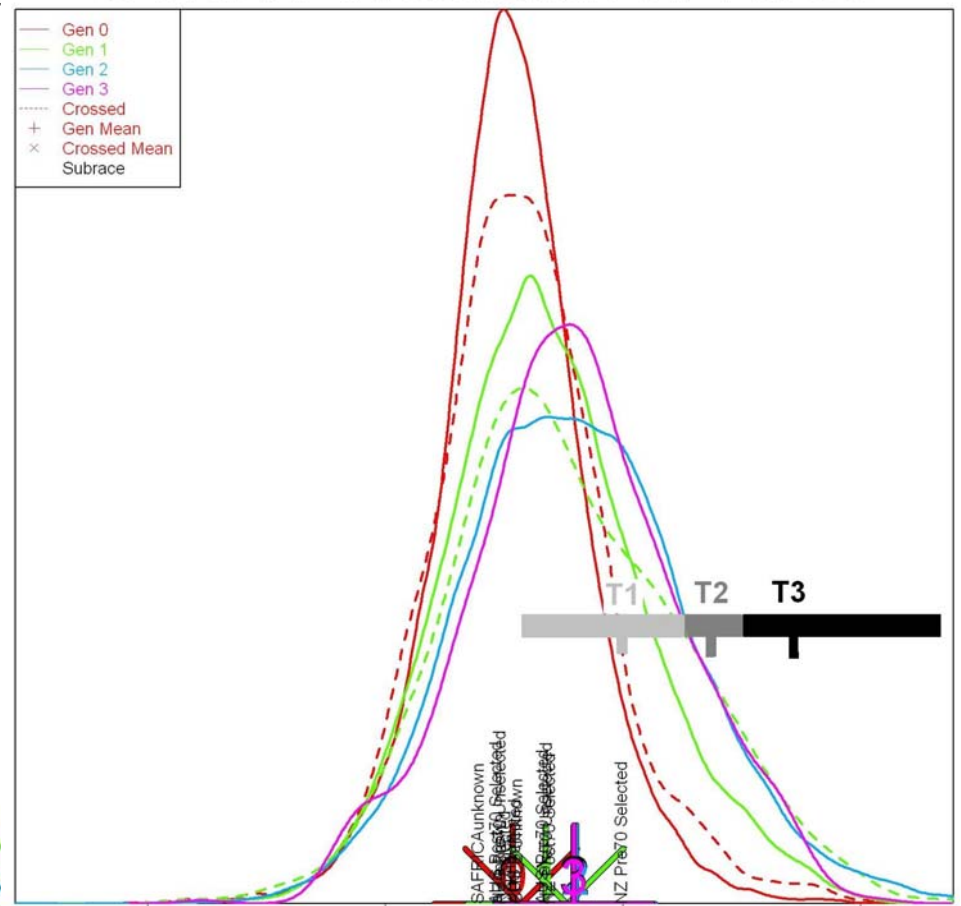
It is possible!

- Last year's families in terciles
- Appreciable differences volume BV

STBA E.globulus BV V5.3



STBA P. radiata BV 2006





Unthinned designs

- Size varies with spacing
- Buffered plots

Square
5x5 +24

seed	1	2	3	4	5	6	7
1	0	0	0	0	0	0	0
2	0	1	1	1	1	1	0
3	0	1	1	1	1	1	0
4	0	1	1	1	1	1	0
5	0	1	1	1	1	1	0
6	0	1	1	1	1	1	0
7	0	0	0	0	0	0	0

Rectangular
4x6+24

seed	1	2	3	4	5	6
1	0	0	0	0	0	0
2	0	1	1	1	1	0
3	0	1	1	1	1	0
4	0	1	1	1	1	0
5	0	1	1	1	1	0
6	0	1	1	1	1	0
7	0	1	1	1	1	0
8	0	0	0	0	0	0

Very Rectangular
3x6+2x16

nthinn	1	2	3	4	5
1	1	1	2	2	2
2	1	1	2	2	2
3	1	1	1	1	2
4	1	1	1	1	2
5	1	1	1	1	2
6	1	1	1	1	2
7	1	1	1	1	2
8	1	1	1	1	2
9	1	1	1	2	2
10	1	1	1	2	2

3x7+2x22

	1	2	3	4	5
1	1	1	2	2	2
2	1	1	2	2	2
3	1	1	2	2	2
4	1	1	1	1	2
5	1	1	1	1	2
6	1	1	1	1	2
7	1	1	1	1	2
8	1	1	1	1	3
9	1	1	1	1	2
10	1	1	1	1	2
11	1	1	1	2	2
12	1	1	1	2	2
13	1	1	1	2	2



Thinned designs

- Longer rotation, so bigger plots & buffers
- For fifth row outrow

Square

$4 \times 6 + 24 + 2 \times 26$

	1	2	3	4	5	6	7	8	9	10
1	1	1	1	2	2	2	2	2	3	3
2	1	1	1	2	2	2	2	2	3	3
3	1	1	1	2	1	1	3	3	3	3
4	1	1	1	2	1	1	3	3	3	3
5	1	1	1	2	1	1	3	3	3	3
6	1	1	1	2	1	1	3	3	3	3
7	1	1	1	2	1	1	3	3	3	3
8	1	1	1	2	1	1	3	3	3	3
9	1	1	1	2	2	2	2	2	3	3
10	1	1	1	2	2	2	2	2	3	3

Rectangular

$4 \times 7 + 26 + 25 + 27 + 25$

ERS	1	2	3	4	5	6	7	8	9	10
1	1	1	2	2	2	3	3	3	3	3
2	1	1	2	2	2	3	3	3	3	3
3	1	1	2	2	2	3	3	3	3	3
4	1	1	1	1	2	1	1	3	3	3
5	1	1	1	1	2	1	1	3	3	3
6	1	1	1	1	2	1	1	3	3	3
7	1	1	1	1	2	1	1	3	3	3
8	1	1	1	1	2	1	1	4	4	4
9	1	1	1	1	2	1	1	4	4	4
10	1	1	1	1	2	1	1	4	4	4
11	1	1	2	2	2	4	4	4	4	4
12	1	1	2	2	2	4	4	4	4	4
13	1	1	2	2	2	4	4	4	4	4



So what do you think?