



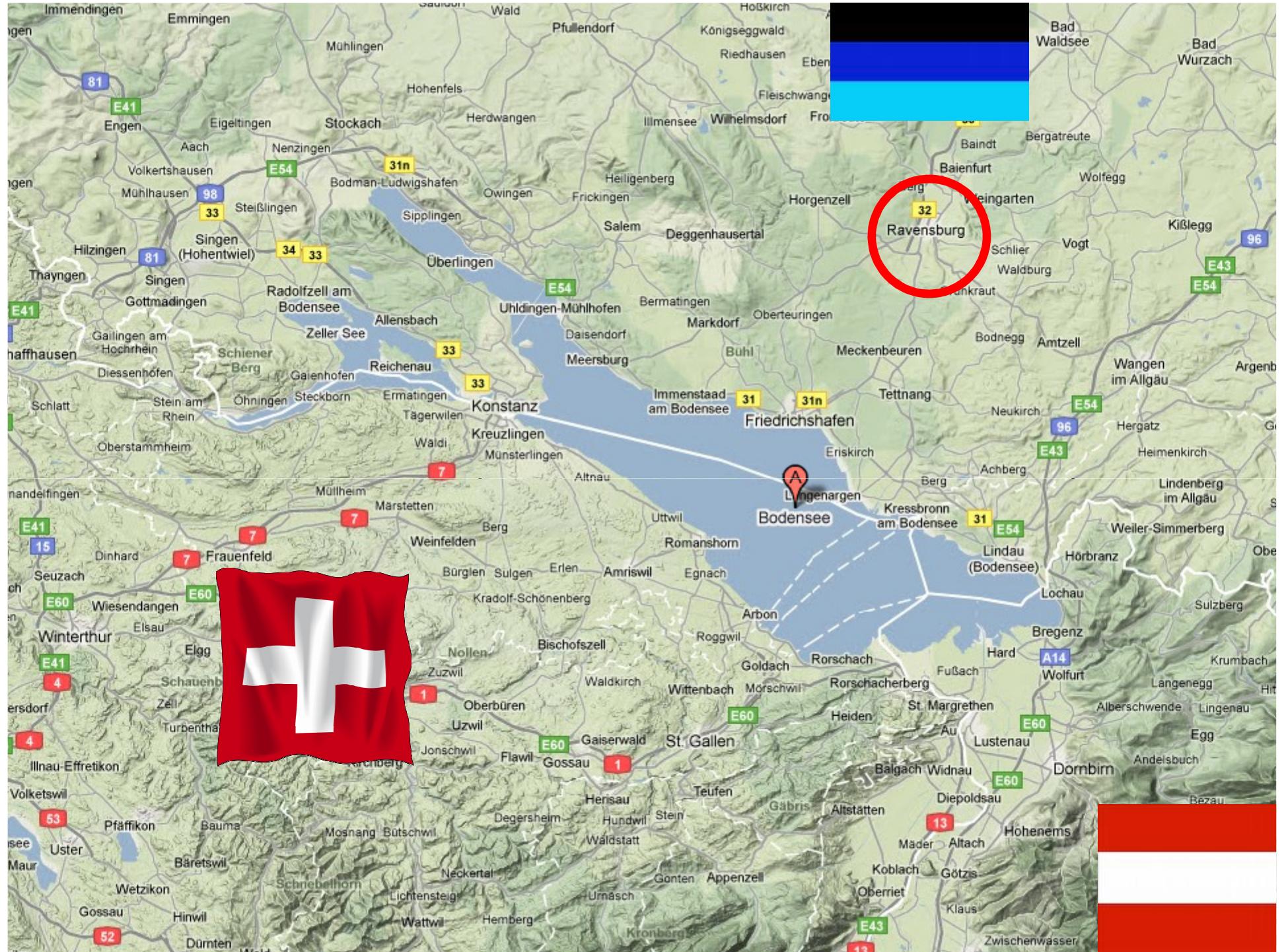
Cropload control

underneath hailnets 2014



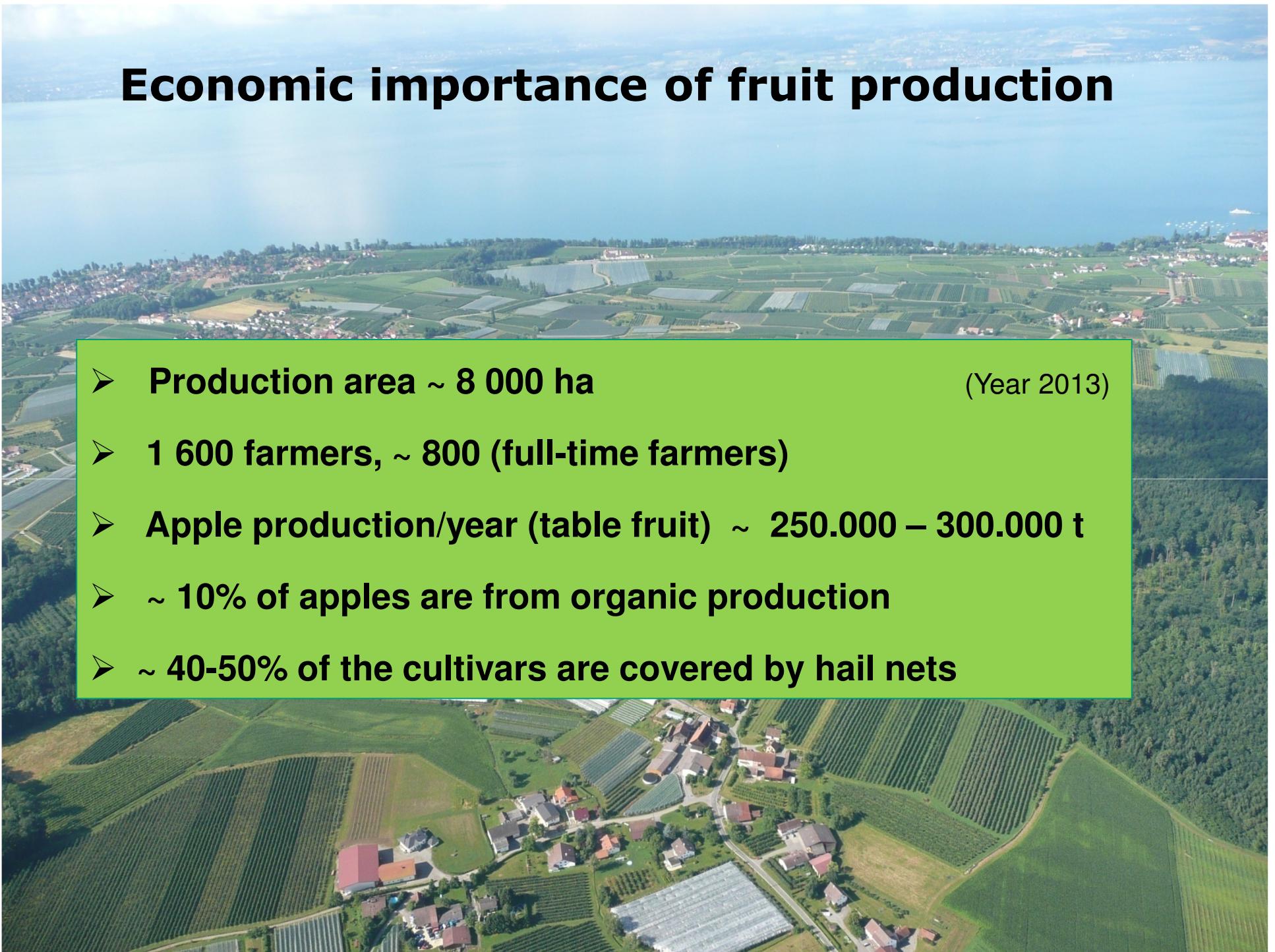
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Ertragsphysiologie

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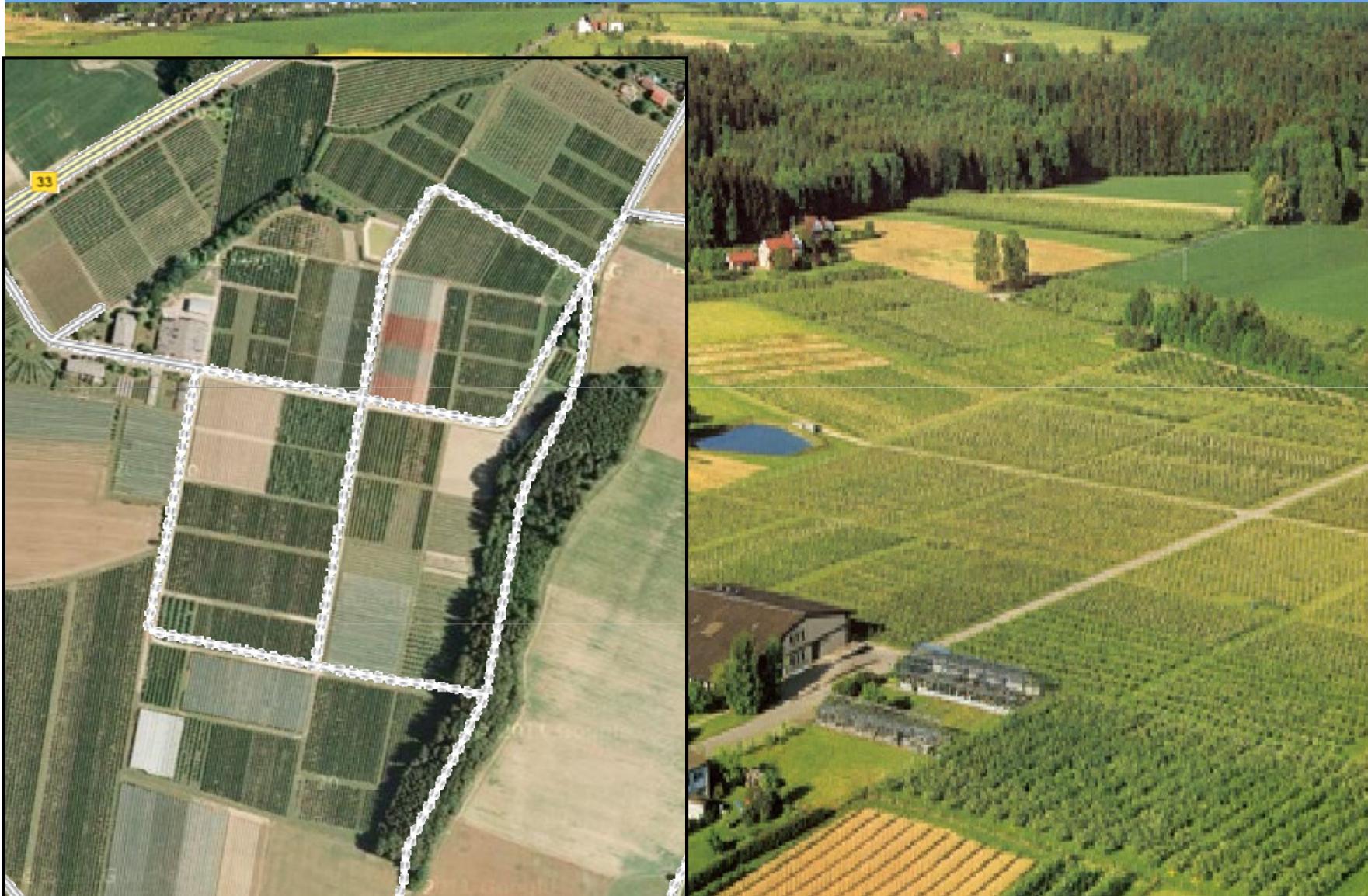
Economic importance of fruit production

- Production area ~ 8 000 ha (Year 2013)
- 1 600 farmers, ~ 800 (full-time farmers)
- Apple production/year (table fruit) ~ 250.000 – 300.000 t
- ~ 10% of apples are from organic production
- ~ 40-50% of the cultivars are covered by hail nets





Foundation Kompetenzzentrum Obstbau Bodensee (KOB)



M. Zoth, Foundation KOB, Ravensburg-Bavendorf, Germany



Cropload control underneath hailnet 2014

Trial design: Cropload control on 'Braeburn' and
'Pinova' apples to improve fruit quality

Orchard: Q 10.1-3 1 year

Planting distance: 3,00 x 0,80/1,00/1,20 m planted: 2002

Situation: production space 100% filled, moderate growing, healthy

4 treatments x 3 nettings x 2 cultivars x 3 replications (plot) x 4 trees

- Improve the efficacy of chemical compounds
- Chemical combinations + mechanical thinning
- ATS + metamitron / ATS + 6-BA
- ATS + Brevis[®], resp. Exilis[®] (= fruit thinner)

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Orchard description

➤ Main parameters

Net coverage: without, white, black

Cultivars: Braeburn ,Hillwell‘, Pinova (standard)

➤ Junior parameters

3,0 m x 0,8 m => 2,4 m² area/tree (4.000 trees/ha)

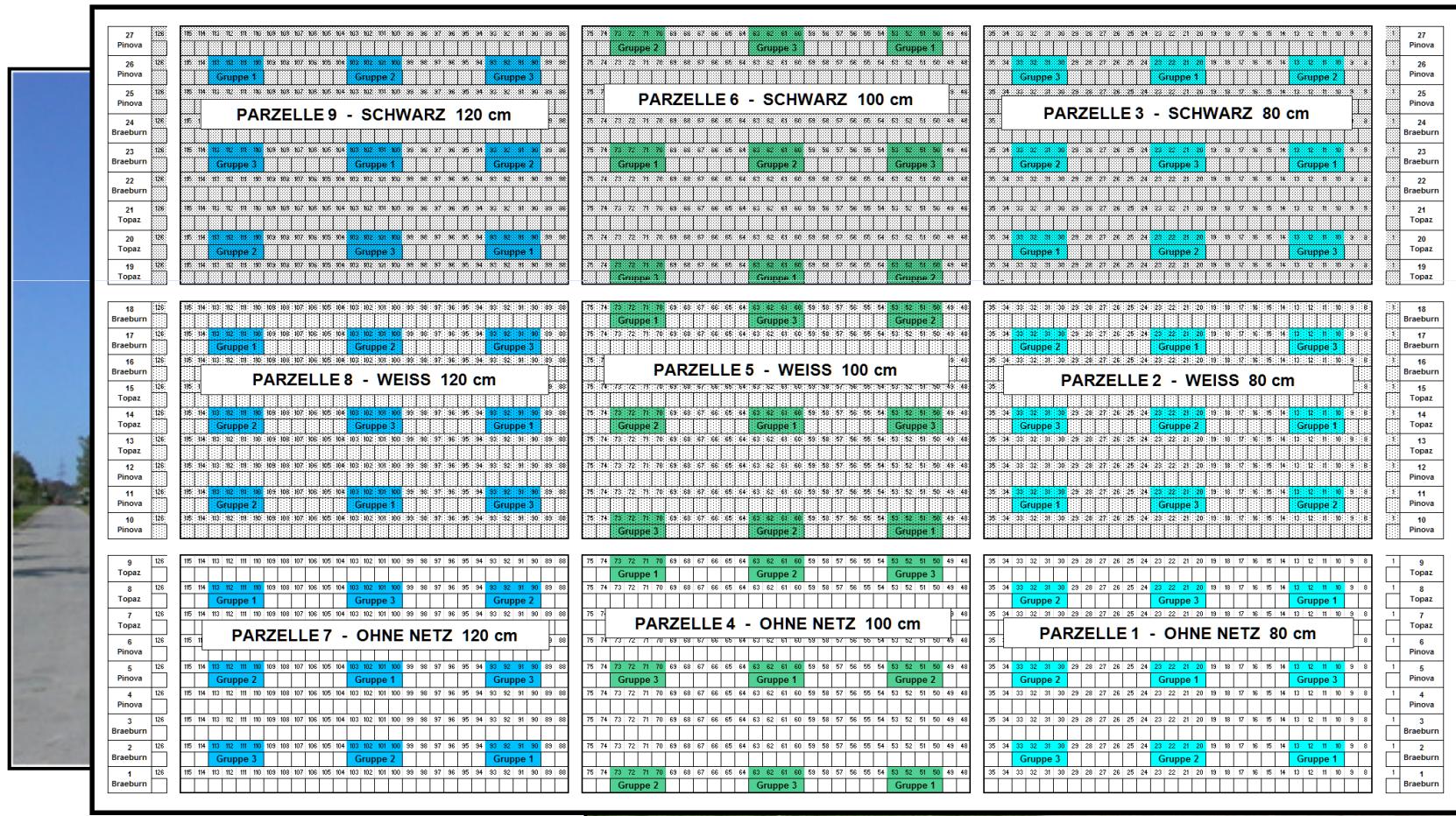
3,0 m x 1,0 m => 3,0 m² area/tree (3.200 trees/ha)

3,0 m x 1,2 m => 3,6 m² area/tree (2.650 trees/ha)

3 nets x 2 cultivars x 3 areas x 3 rep. x 4 trees

Cropload control underneath hailnet 2014

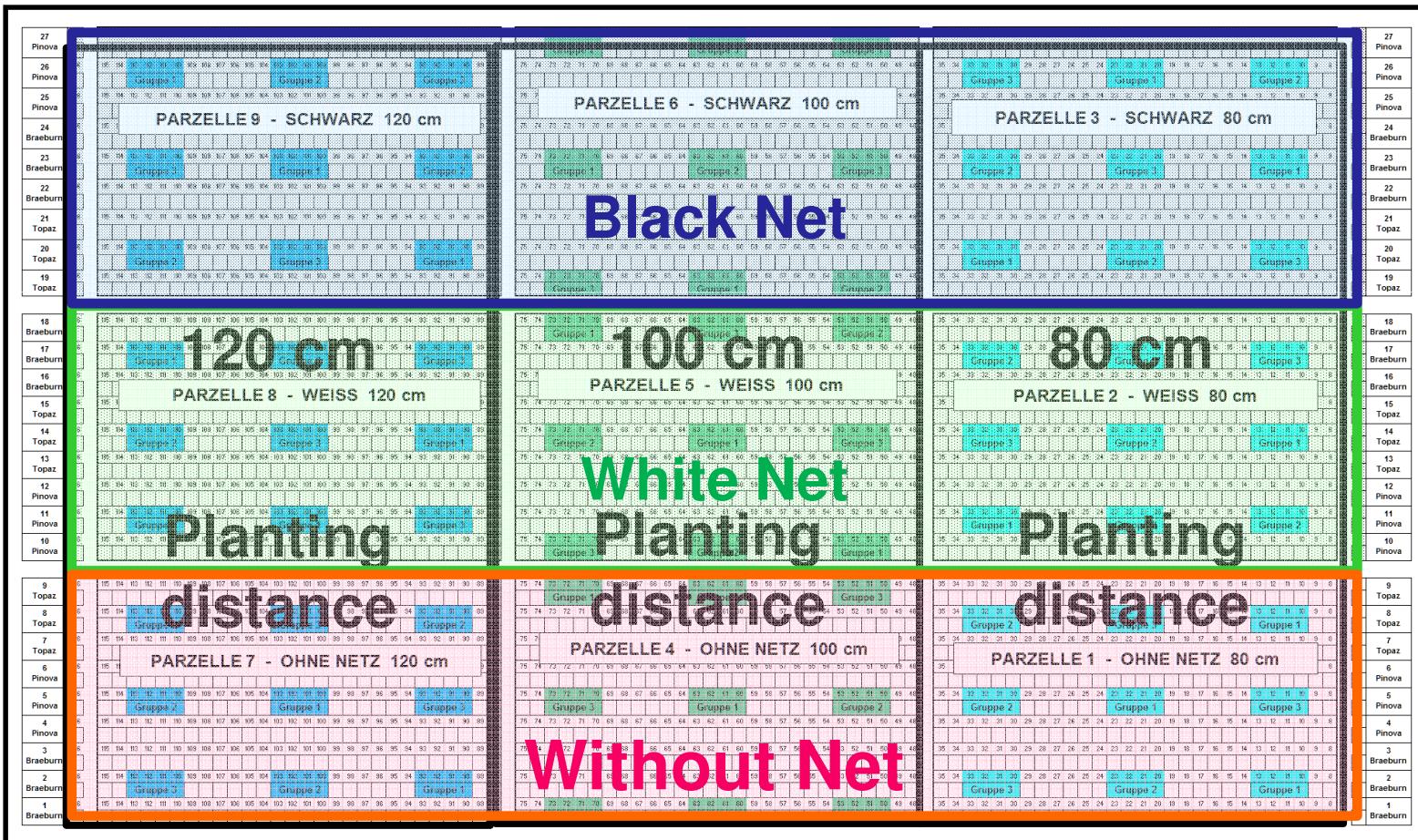
Orchard description





Cropload control underneath hailnet 2014

Orchard description



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Orchard description



Cropload control underneath hailnet 2014

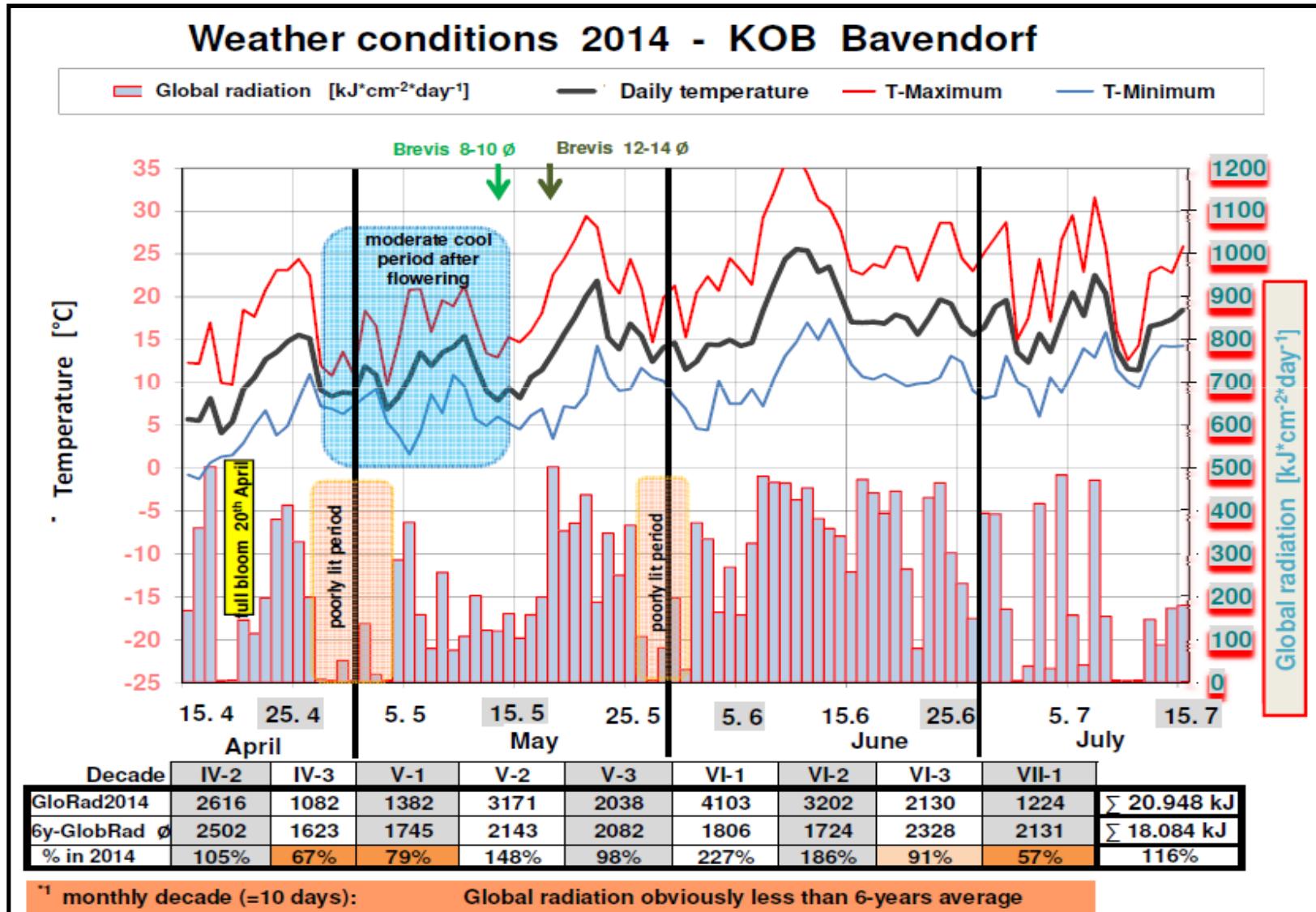
NR	VAR	Treatment	Dosage kg / l per hektar	Water amount/ha	At time
1	DAR	DARWIN strong	6km/h velocity 260 rpm spindle rotation	-	Date: FB 23.4.2014 13:25; 21,4°C, 30% R.LF
2	ATS + BA	a. ATS b. BA (FINE)	a. AGRO N FL. 60L/ha b. EXILIS 7,5 l/ha 12 Ø mm before warming	a. 1000 l/ha b. 1000 l/ha	1. Date: FB 23.4.2014 10:25, 16,4°C, 30% R.LF 2. Date: 16.5. 12mm Ø 9:15, 20,2°C, 43% R.LF
3	ATS + META	a. ATS b. + Metamitron later 12mmØ	a. AGRO N FL. 60L/ha b. 2,2 kg/ha=333ppm BREVIS	a. 1000 l/ha b. 1000 l/ha	1. Date: FB 23.4.2014 10:25; 16,4°C, 30% R.LF 2. Date: 16.5. 12mmØ 8:10, 18,5°C, 44% R.LF
4	HAND	Handthinning	Production aim ~50 t/ha	-	Cropload per TCSA+CV on 20 July 2014
Unroll the rolled-up hailnets after end of flowering				Date: 5. May 2014	12 DAFB

Mechanical thinning underneath hailnet

Device ‚Tree-Darwin 200‘



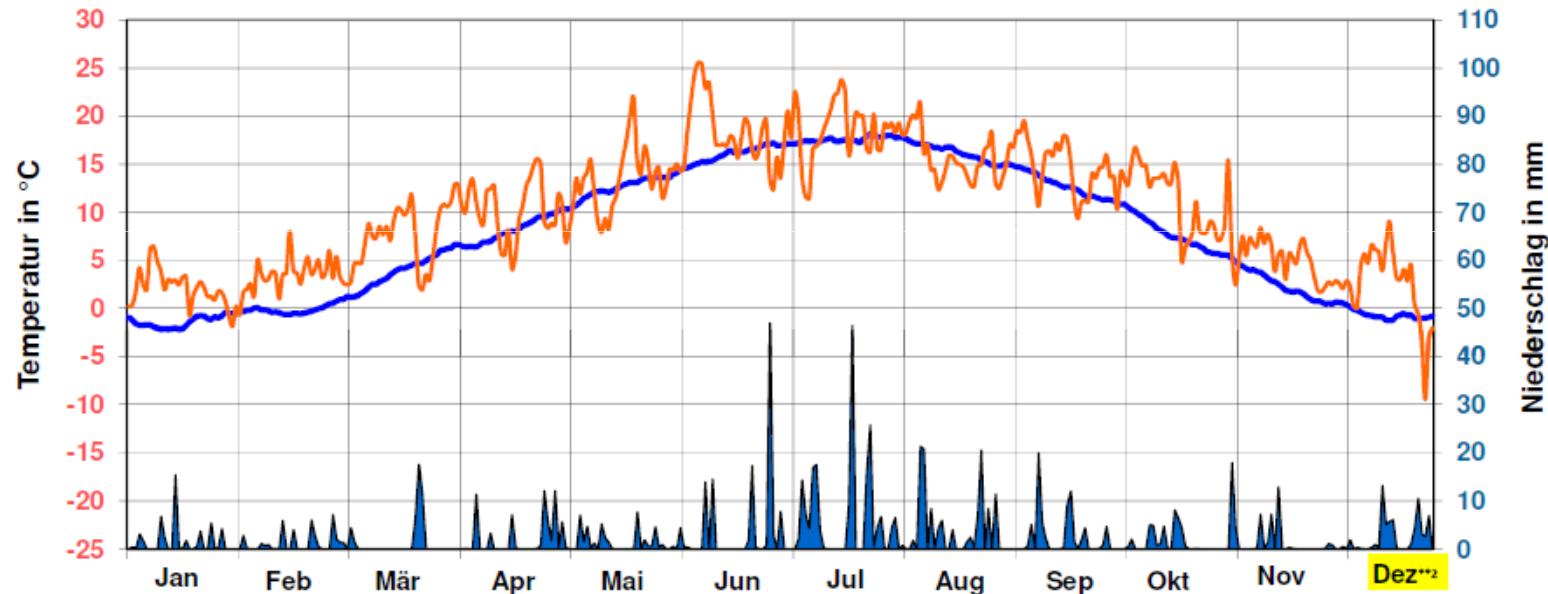
Weather after blooming - 2014



Weather over the season - 2014

Wetterverlauf 2014 - Stiftung KOB Bavendorf

Niederschlag Langjährige Mitteltemp. 1961 - 2013 Tages-Mitteltemp.



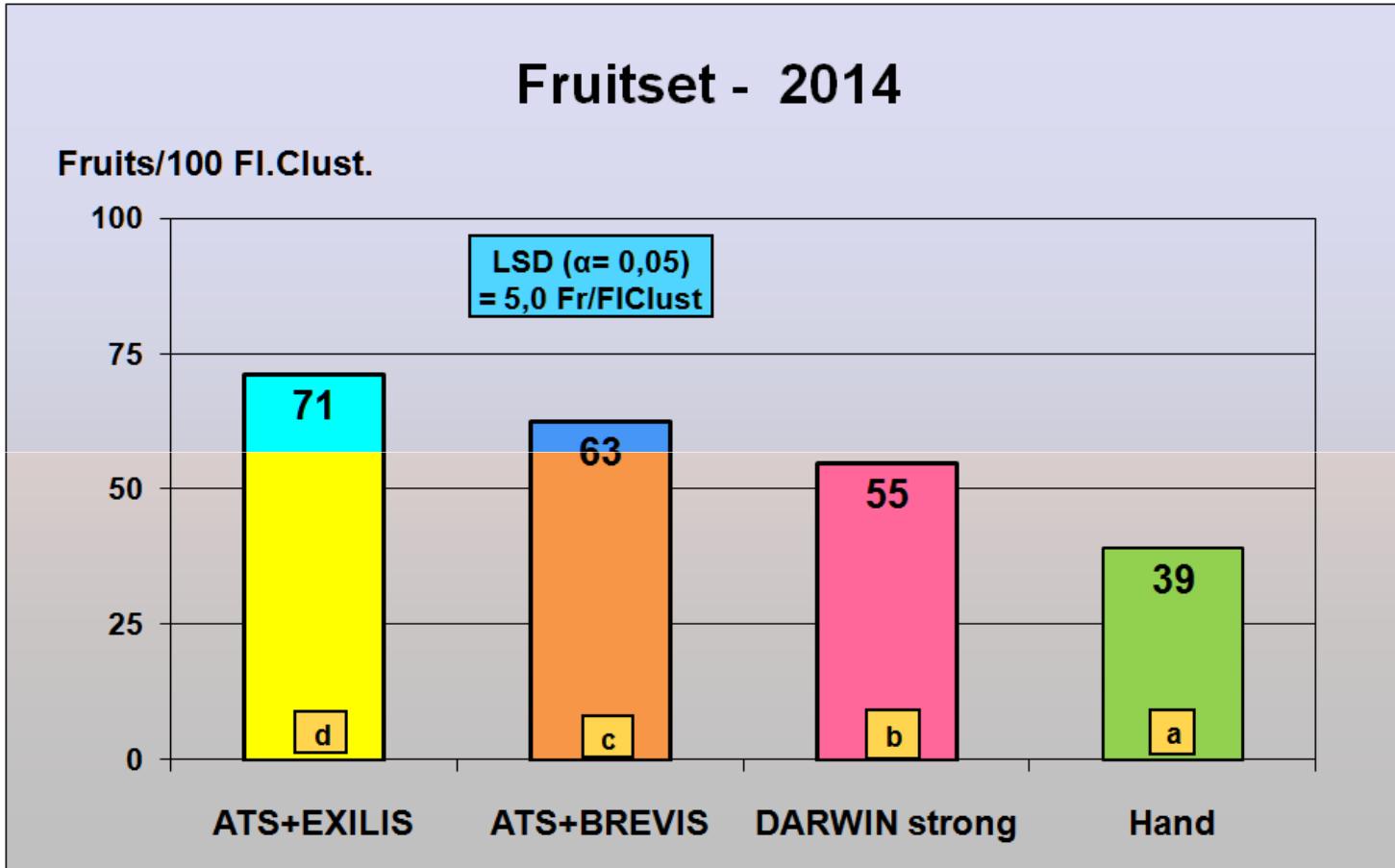
	2014 *** ³ Jahresmittel		Langjähriges Jahresmittel
Temp. °C	2,0	-1,1*	10,3 °C
NS in mm	66	87%*	865 mm
Sonne h	69	130%*	956 mm
	120	141%*	1795 h
	207	149%*	1738 h
	175	102%*	
	191	90%*	
	293	133%*	
	192	79%*	
	169	75%*	
	151	87%*	
	137	123%*	
	52	88%*	
	40	88%	

*Vergleichswerte zu den langjährigen Monatsmittelwerten am KOB Bavendorf

2015 Kompetenzzentrum Obstbau - Bodensee / M.Zoth

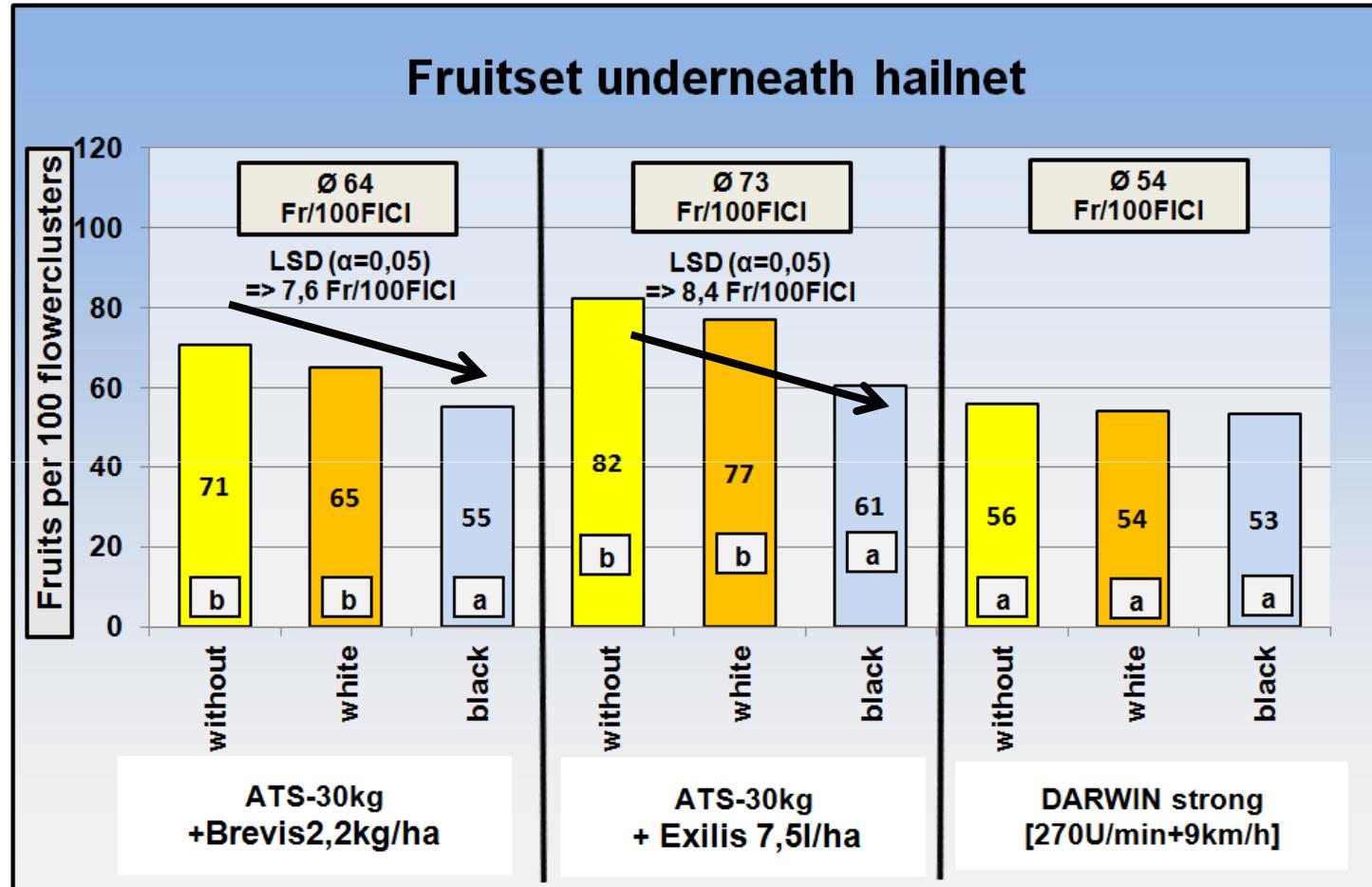
² Monat Dezember 2014: extrem zu warm, wenig Sonnenschein *³ gesamtes Jahr 2014: deutlich zu warm, weniger Niederschlag, mehr Sonne

Cropload control underneath hailnet 2014



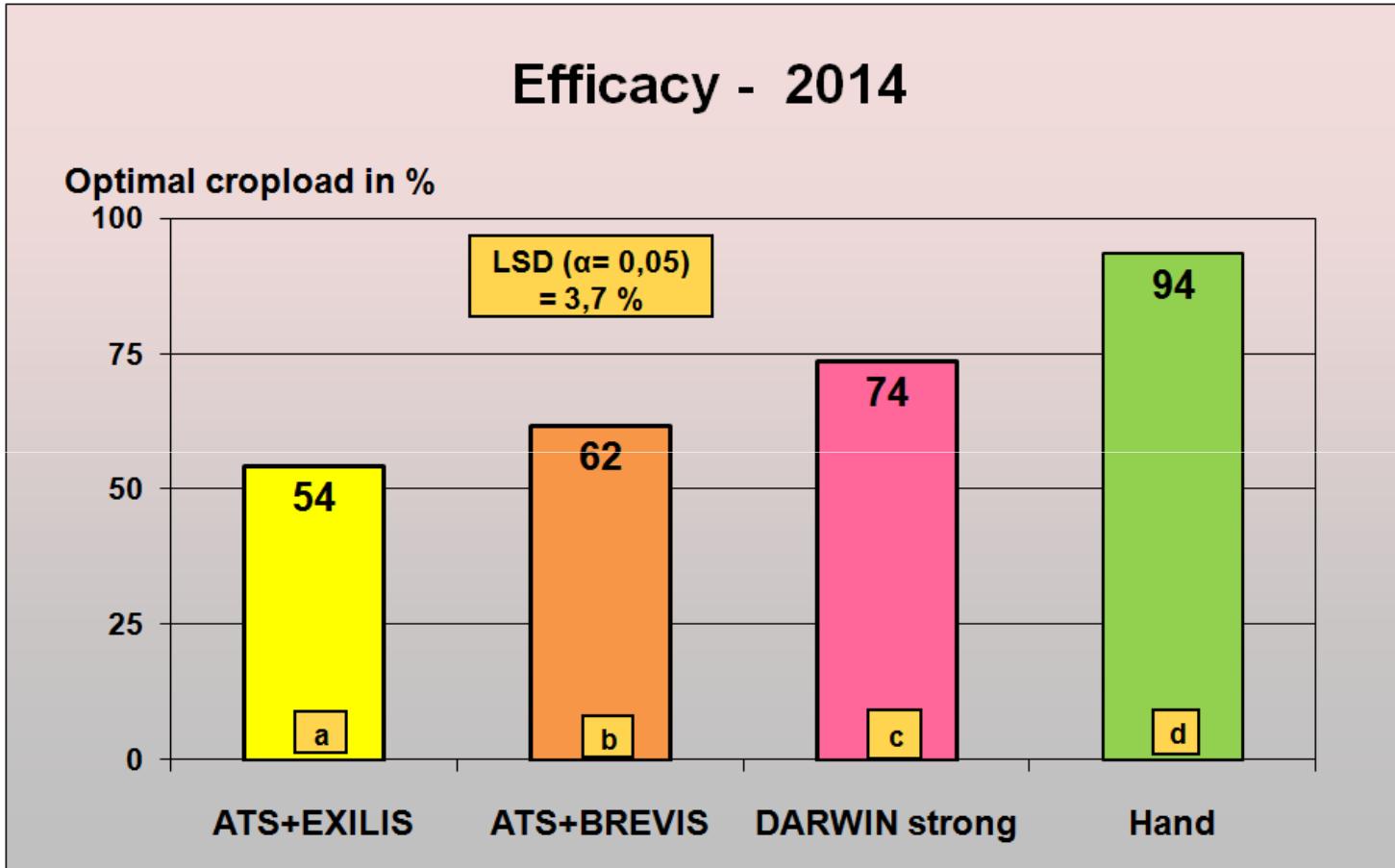
- Clearly different fruitset reduction visible.

Cropload control underneath hailnet 2014



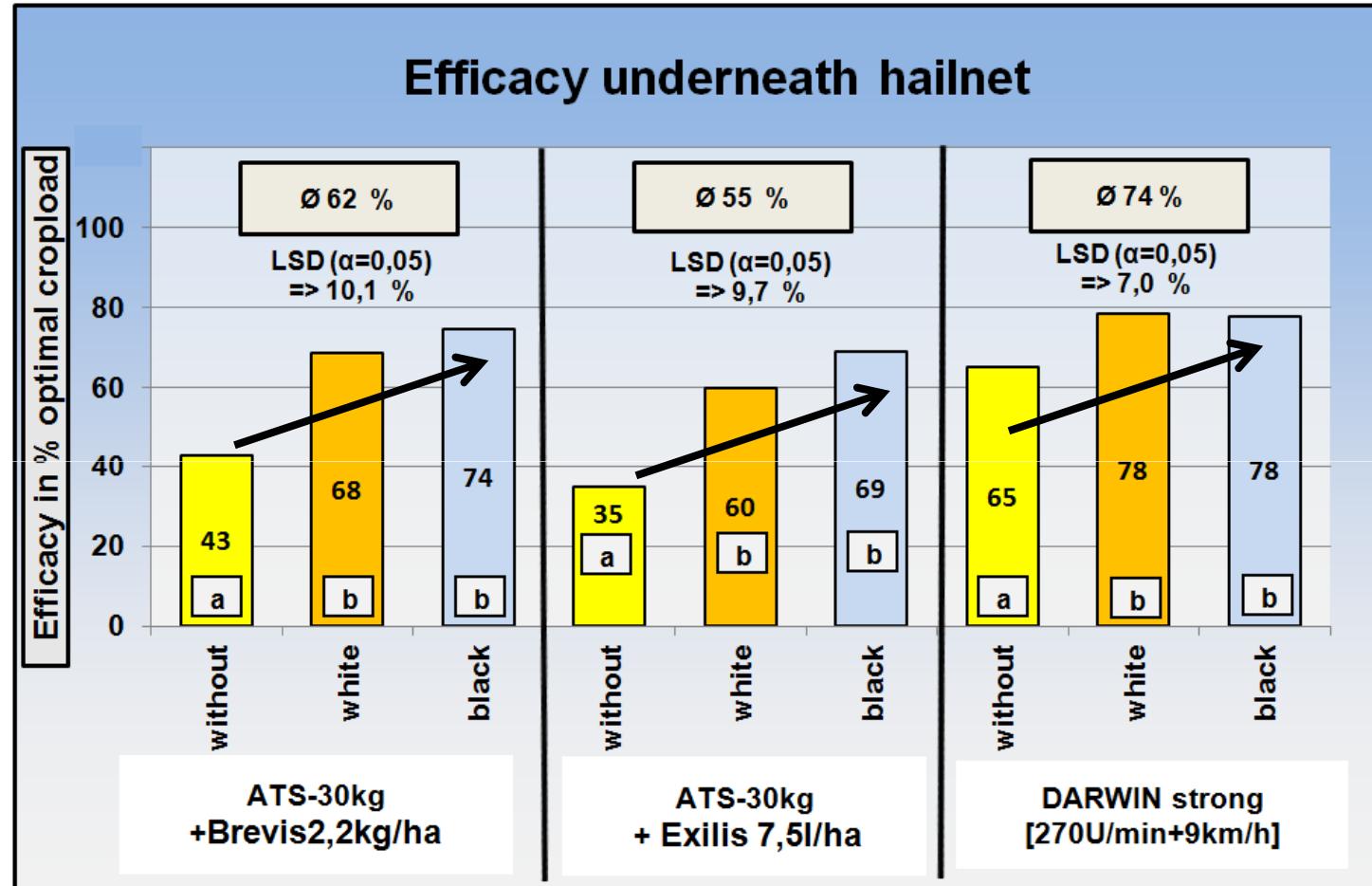
- Using fruit thinners => less fruitset with black net

Cropload control underneath hailnet 2014



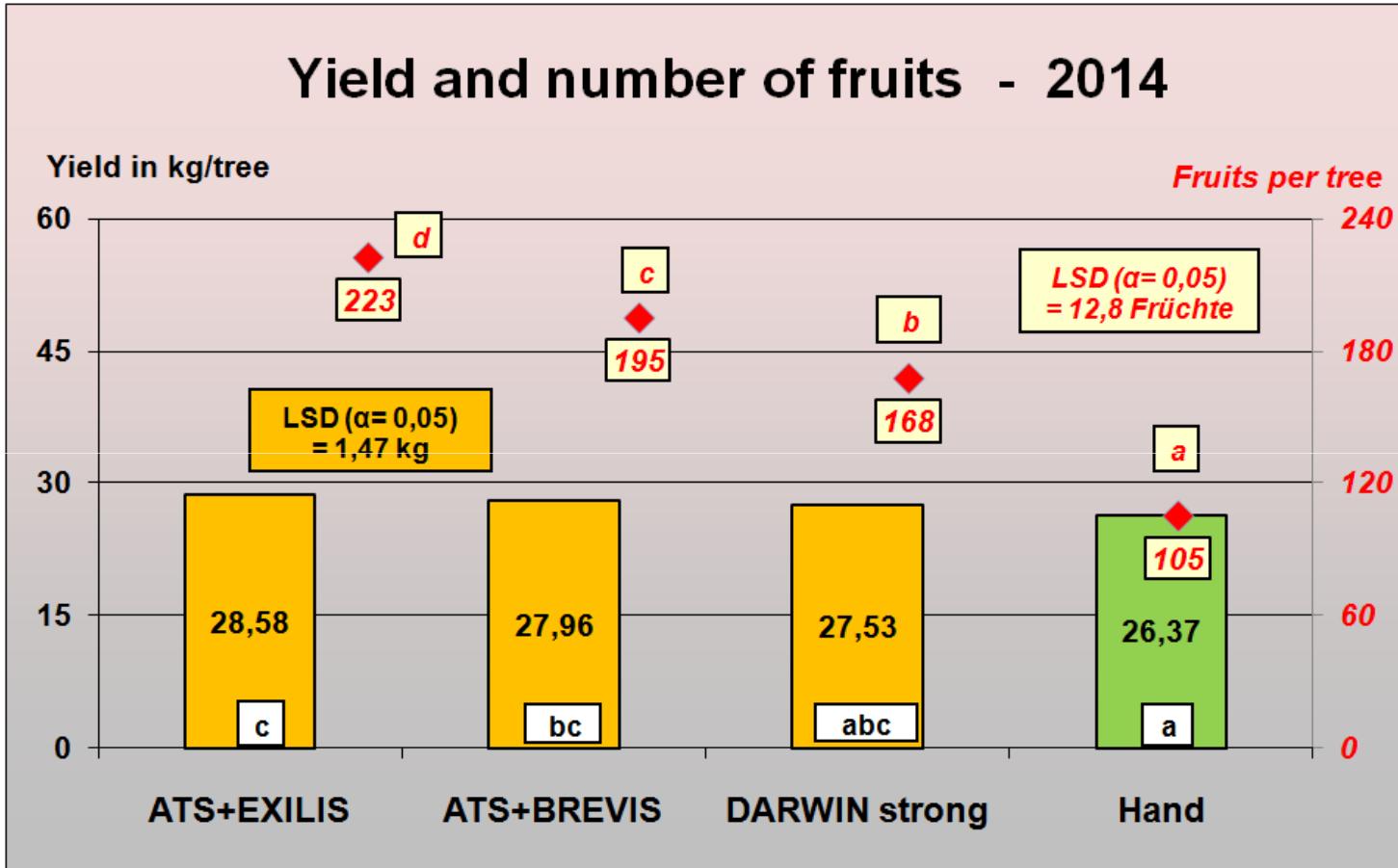
- Good efficacy values could be seen.

Cropload control underneath hailnet 2014



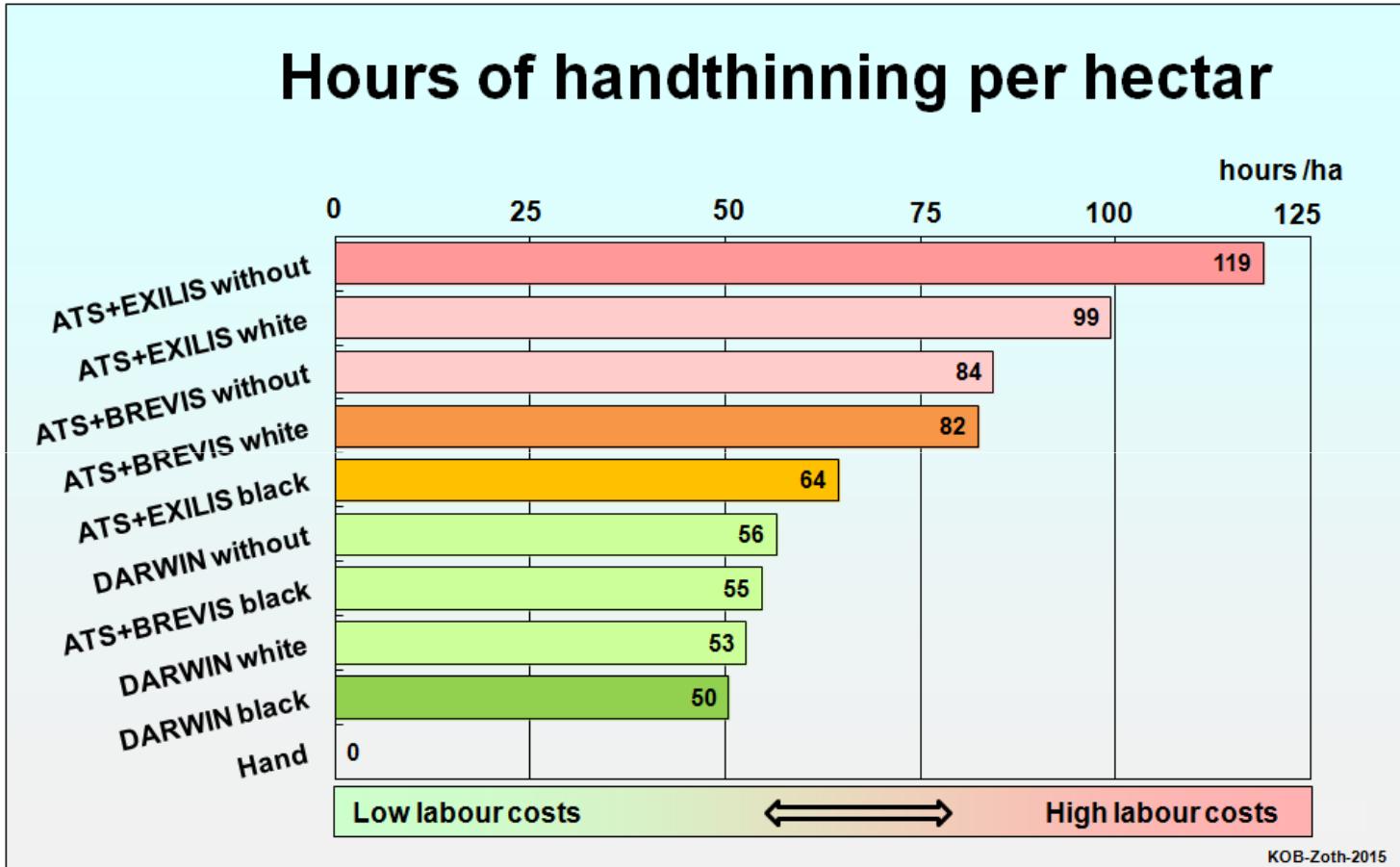
- Thinning efficacy was increasing under the nets.

Cropload control underneath hailnet 2014



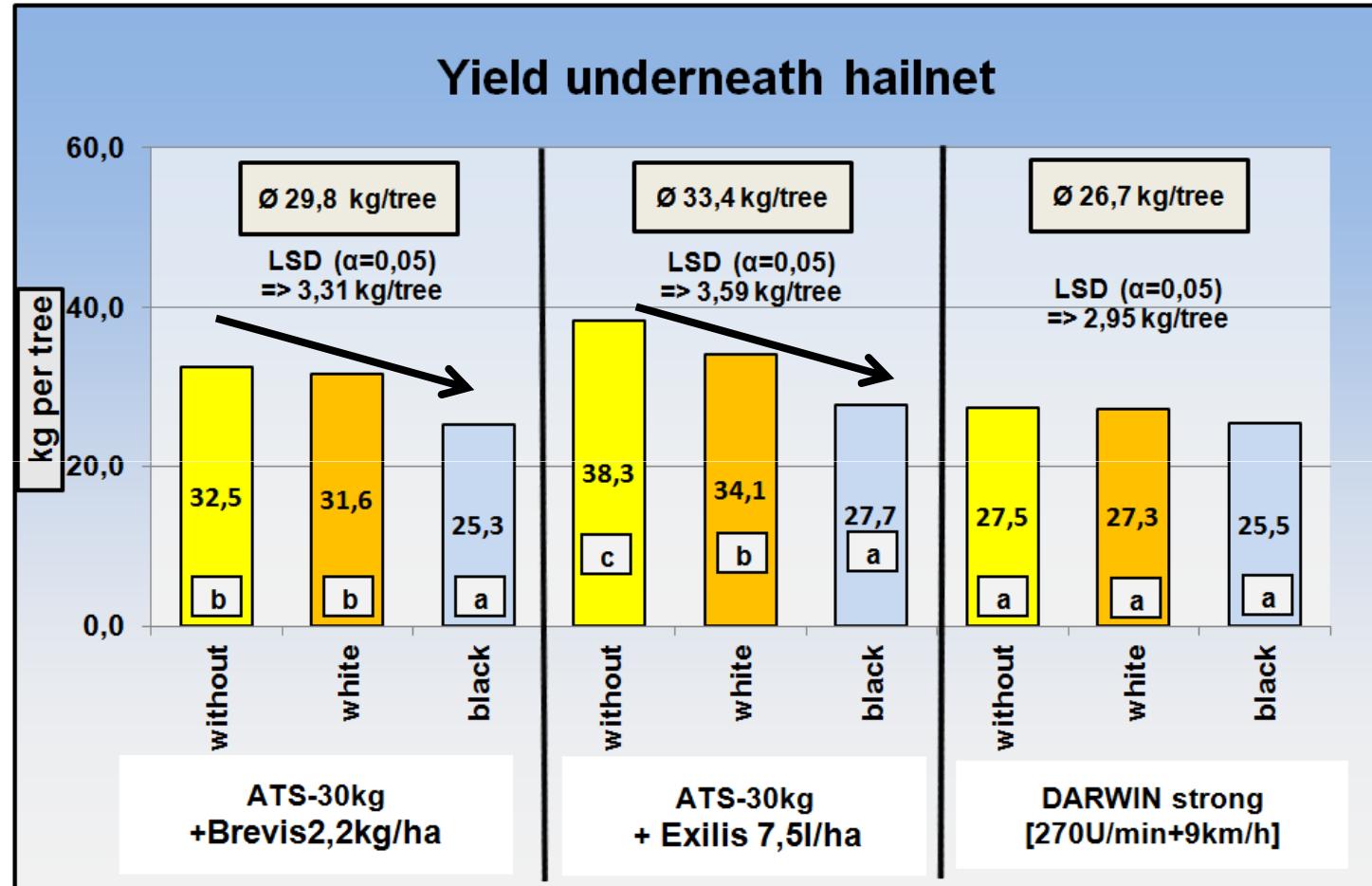
➤ Fruitload was still very high.

Cropload control underneath hailnet 2014



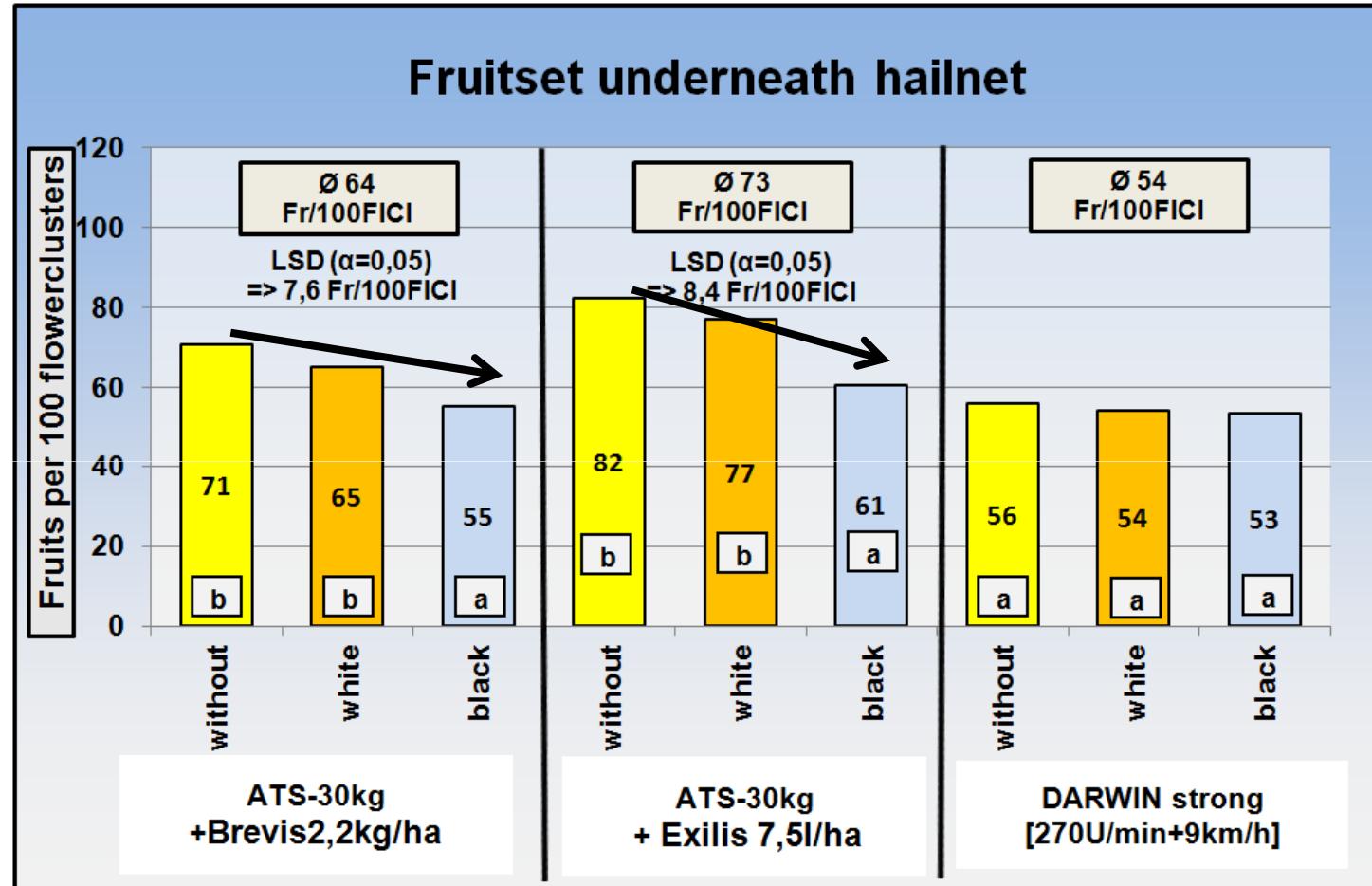
- Wide range in handthinning time savings corresponding with efficacy.

Cropload control underneath hailnet 2014



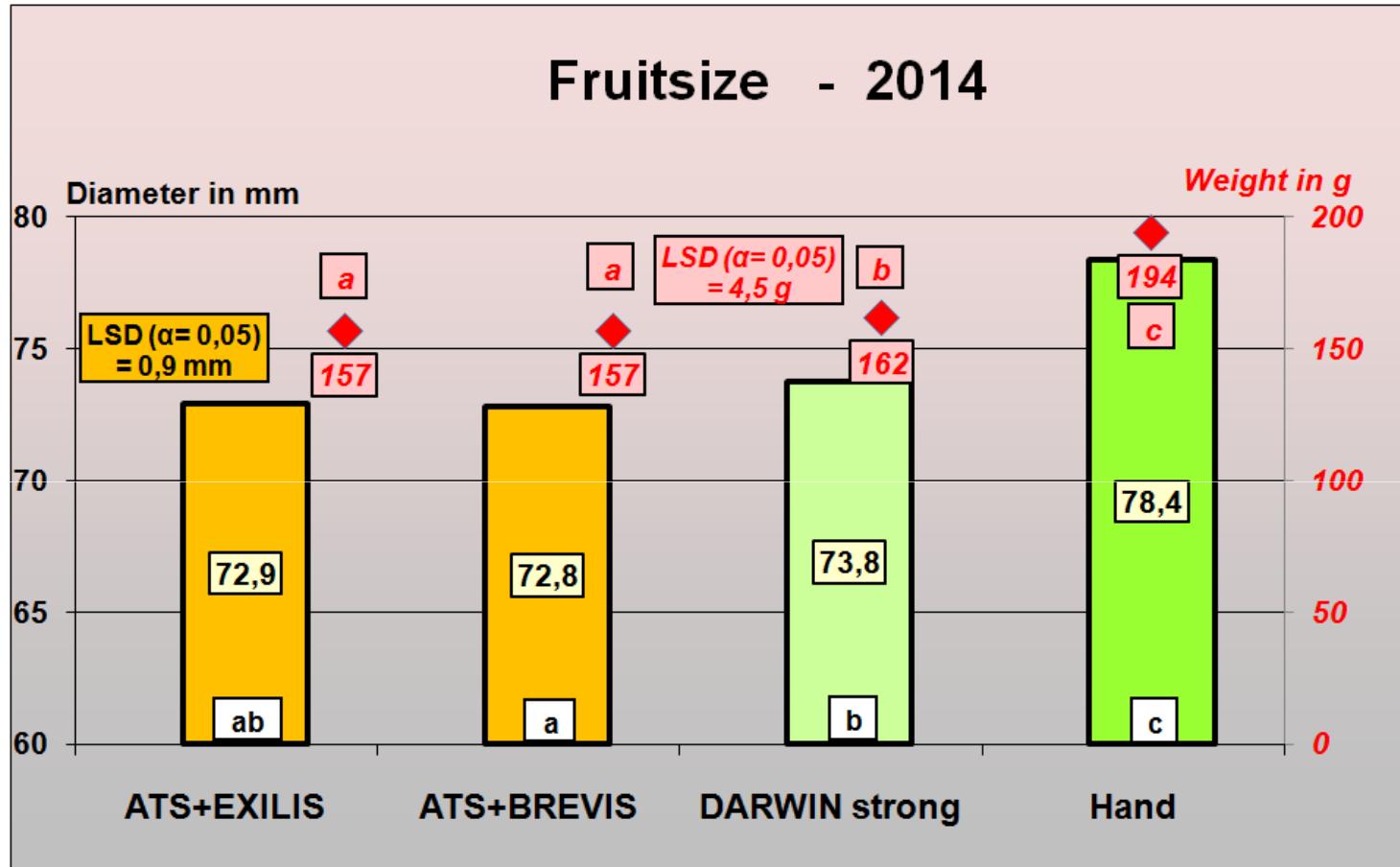
➤ Yield went down under the net coverages.

Cropload control underneath hailnet 2014



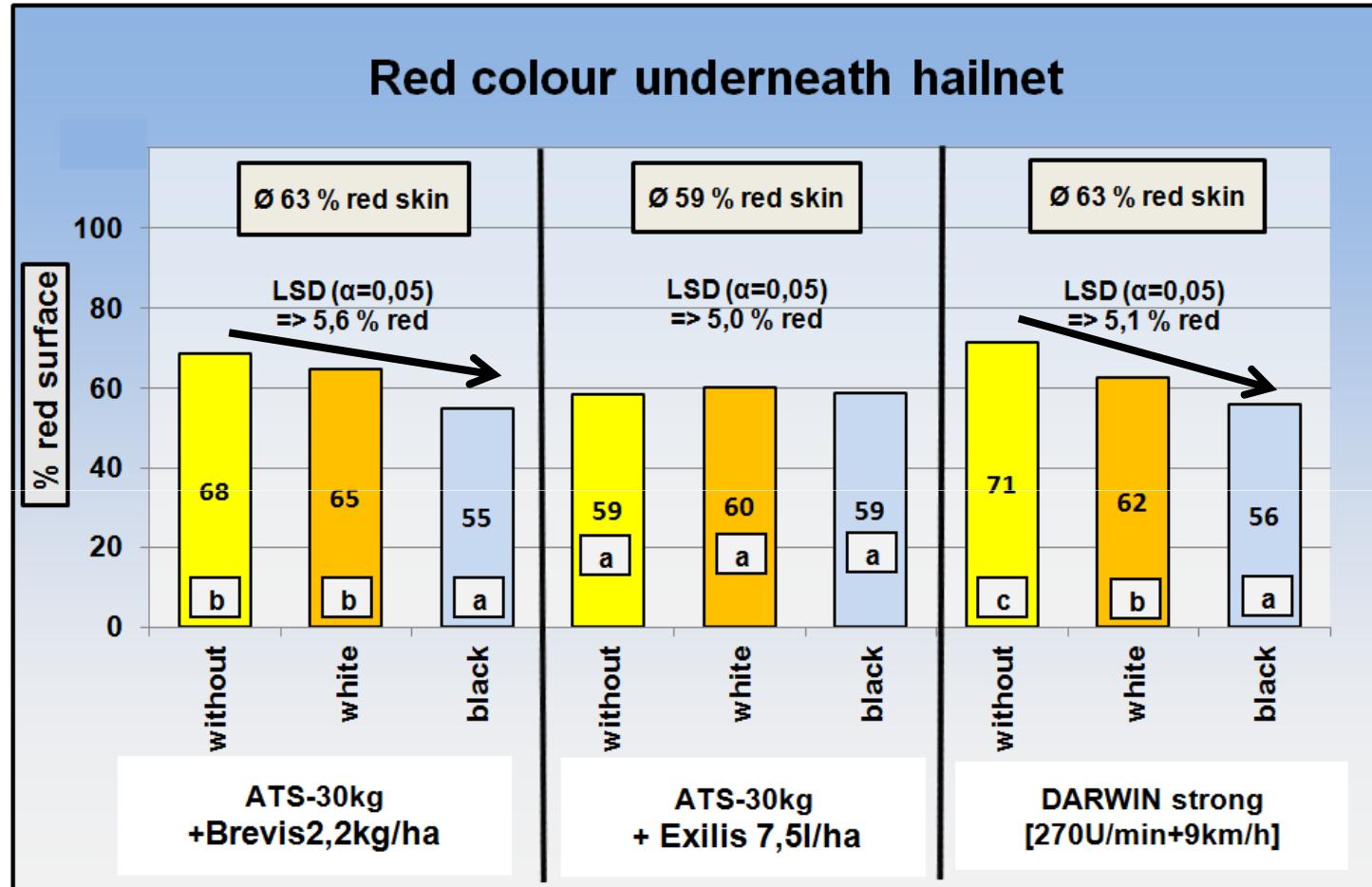
➤ Number of fruits went down under black net.

Cropload control underneath hailnet 2014



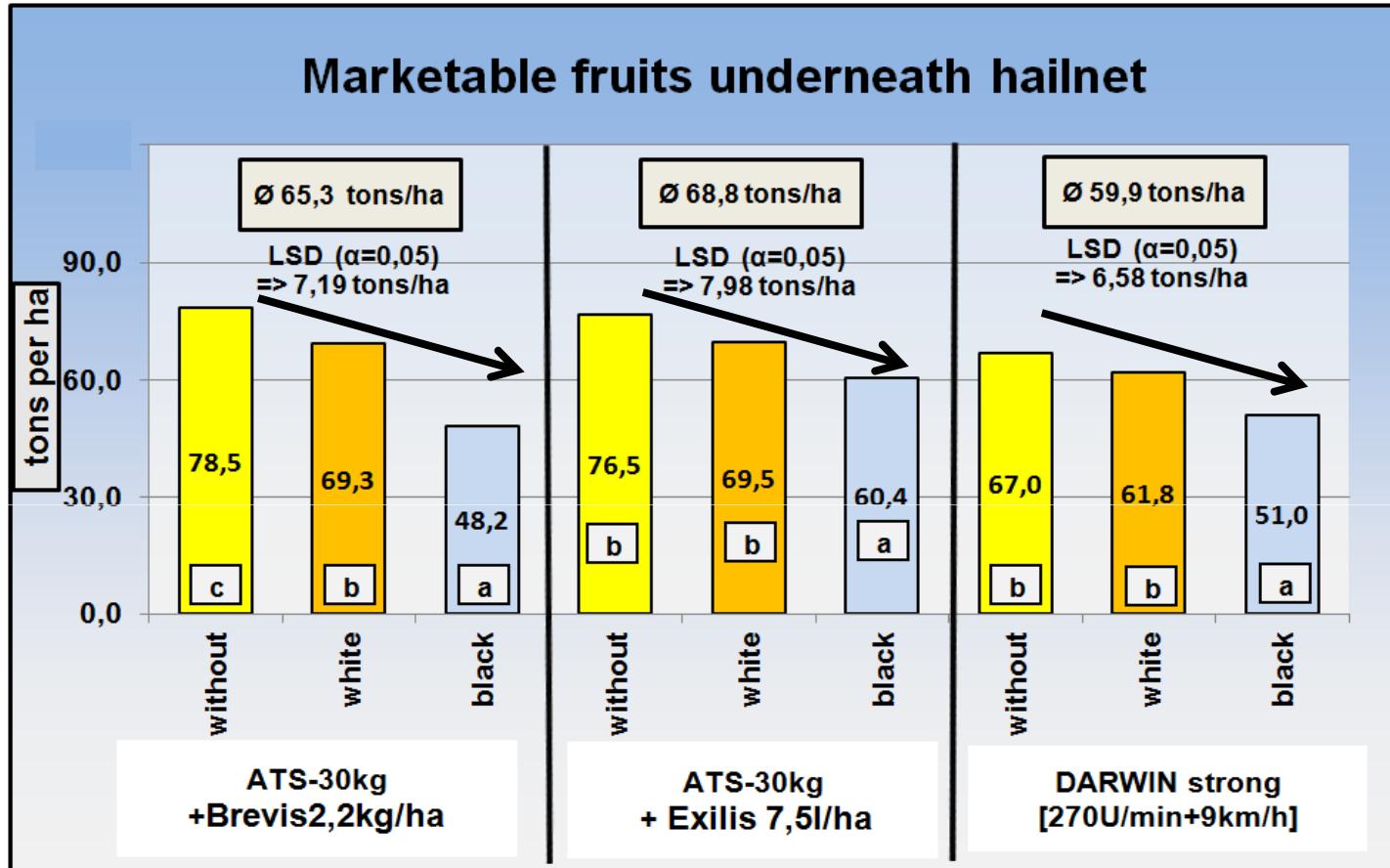
- Darwin showed better fruitsize.
- Related with the smaller cropload.

Cropload control underneath hailnet 2014



- Red skin colour went down under hailnets.
- Reduction was related also to the cropload.

Cropload control underneath hailnet 2014



- Marketable yield went down under hailnets.
- Especially when using the black coloured net.
- The usage of Brevis® might be more risky.

Radiation underneath hailnet (KOB station)

Cumulated PAR (radiation) measurements covering 3 month of the production season

Kumulierte und mittlere Photonenflussdichte (PPF) stationärer PAR-Sensoren (QS2 Quantum), Zeitraum Juli-Sept. 2006 (98 Mess Tage jeweils 6.00 - 19.29 Uhr)				
		Control	White	Black
Gesamteinstrahlung PPF	mol m ⁻²	3.614	3.079	2.747
Ø Einstrahlung PPF	mmol m ⁻² s ⁻¹	0,8681	0,7394	0,6597
Relativ	%	100	85,2	76,0

- Big differences between cumulated photone-irradiation could be observed when using nets.

Reduction: ~15% white net/ ~25% black net

Conclusion

- **Mechanical thinning is as well effective than chemical compounds - even more .**
- **The combination of flower thinners like ATS with fruit thinning chemicals like 6-BA or Metamitron lead to better cropload control.**
- **Brevis® (Metamitron) is not the “only solution”, but it is a powerful component.**
- **Brevis® (Metamitron) used under hailnets could be problematic, if there are poor light conditions:
=> black colour / low radiation / sensitive cultivars**



Thanks

for your attention

