Automated spraying in Fruit Orchards

Introduction arable farming case

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Casus arable farming

Challenge: maximize fruit growers income at long term

- Maximize yield & quality
  - Yield (kg/ha) x quality (€/kg) = Returns (€/ha)
- Minimize environmental load
  - Licence to produce
  - Maximize market opportunities
- Reduce costs
  - Labour demand versus fixed costs for investments
    - Autonomous
    - Multi-row sprayers
  - Choice of pesticides

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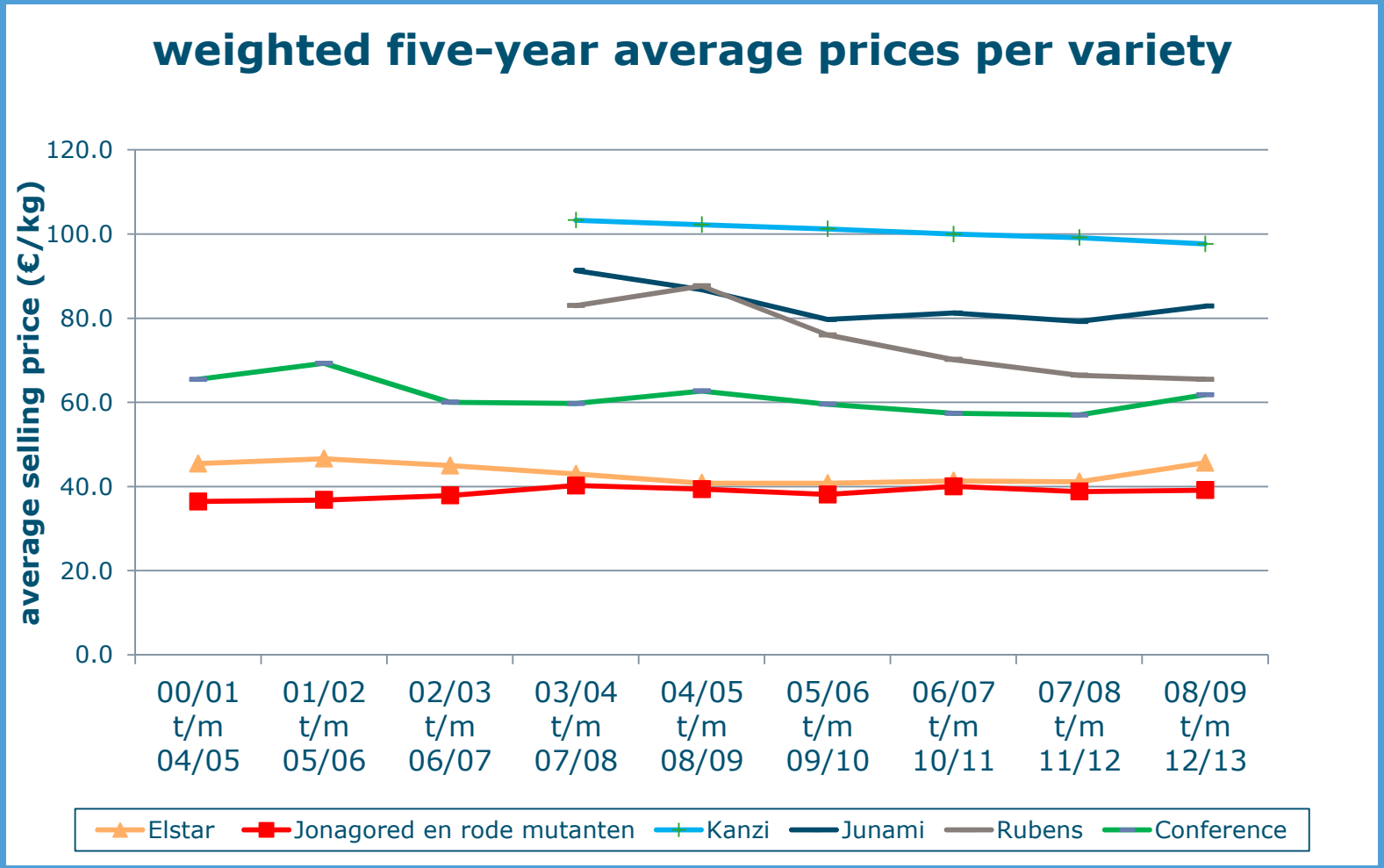
Excursion: fruitgrower Westreenen, Echteld

Modern fruit grower (premium supplier of supermarket chain)

"Choice of variety is very important"

- Yield → cost price, returns
- Price (see next slide)
- Storability → supply security, marketability → selling price
- Quality → selling price)
- Susceptibility to diseases → pesticide use → costs and effect on quality → selling price
- Easiness of culture → labour demand → cost price
- Different harvest times → organisation of work (> 2.500 tons of fruit within 8-9 weeks)

Effect of variety on selling prices



Excursion: Mr. Westreenen, Echteld

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Fruit production & sustainability

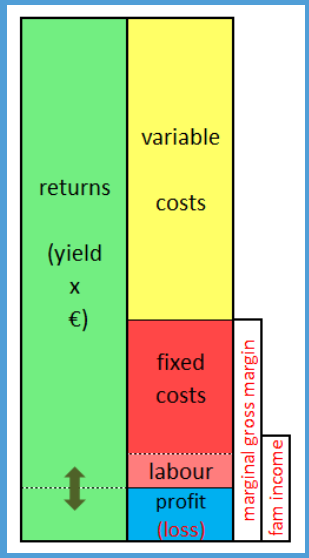
- Some of the Triple P aspects for a fruit grower:
  - People:
    neighbours, employees, consumers, society (village)
  - Planet:
    water quality, water availability, eutrophication, biodiversity, waste
  - Profit:
    yield, production costs, supply security, farmers income

Content arable farming case

- Wk 3: Environmental aspects
  - Rik de Werd

- Wk 4: Social aspects
  - Peter Roelofs

- Wk 5: Economic aspects
  - Peter Roelofs



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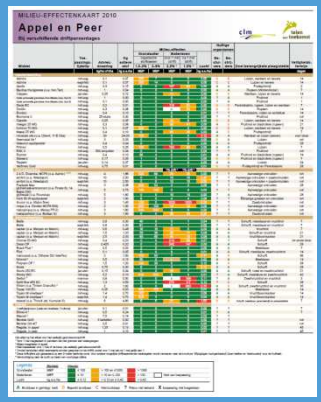
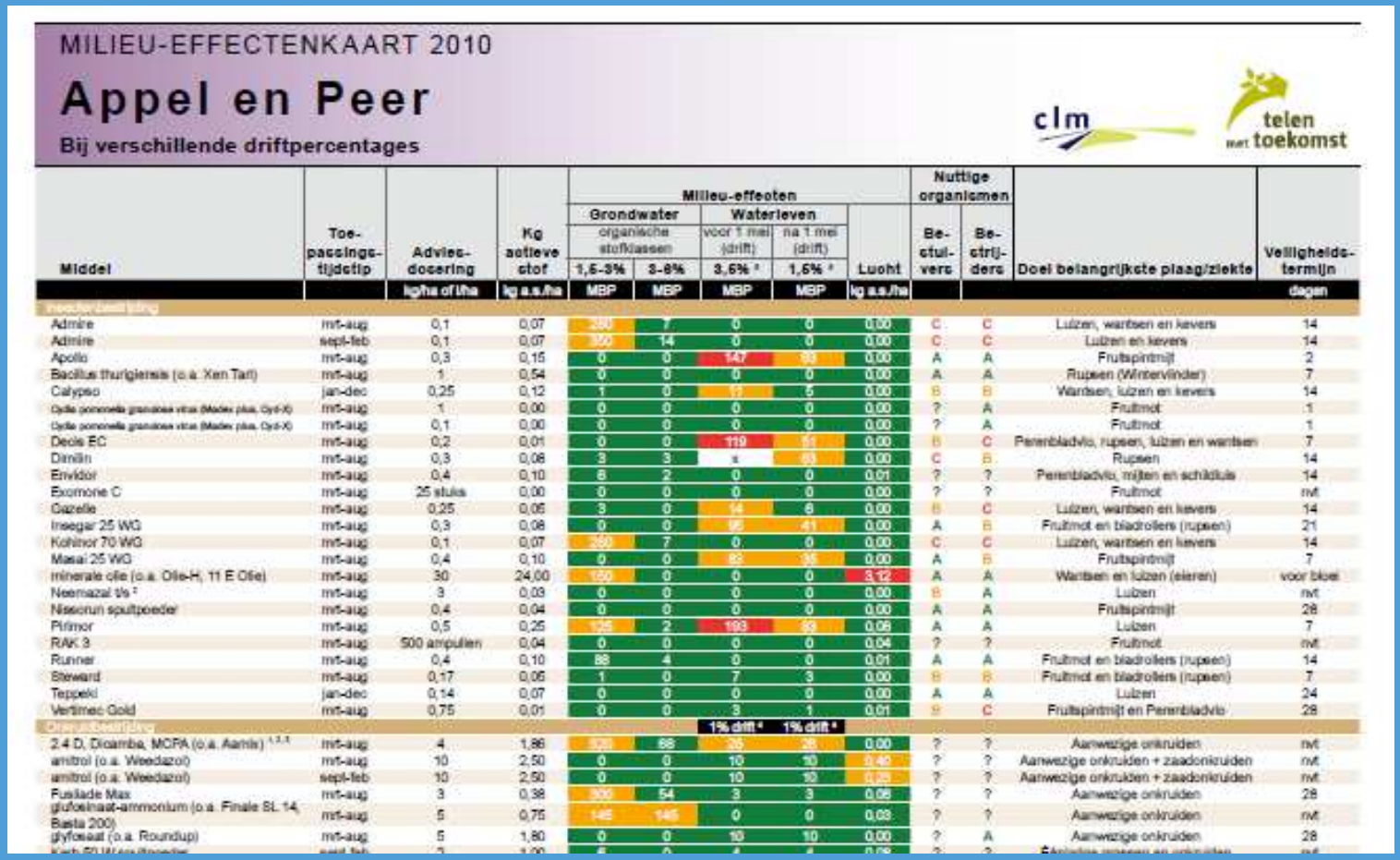
Environmental aspects:

- Focus on crop protection
  - Emission routes pesticides
    - Diffuse emissions
    - Point emissions
  - Spraying techniques
    - Sprayer types
    - Nozzle types
  - Spraying schedule
    - CLM environmental yardstick



Environmental aspects:



MILIEU-EFFECTENKAART 2010

Appel en Peer

Bij verschillende driftpercentages

clm — telen met toekomst

Middel	Toe-passings-tijdstip	Advies-dosering	Kg actieve stof	Milieu-effecten: Grondwater, organische stofklassen 1,5-3%	Grondwater, organische stofklassen 3-6%	Waterleven, voor 1 mei (drift) 3,5% ¹	Waterleven, na 1 mei (drift) 1,5% ¹	Lucht	Nuttige organismen: Be-stuif-vers	Nuttige organismen: Be-strij-ders	Doel belangrijkste plaag/ziekte	Veiligheids-termijn
		kg/ha of l/ha	kg a.s./ha	MBP	MBP	MBP	MBP	kg a.s./ha				dagen
Admire	mrt-aug	0,1	0,07	250	7	0	0	0,00	C	C	Luizen, wantsen en kevers	14
Admire	sept-feb	0,1	0,07	250	14	0	0	0,00	C	C	Luizen en kevers	14
Apollo	mrt-aug	0,3	0,15	0	0	142	58	0,00	A	A	Fruitspintmijt	2
Bacillus thuringiensis (o.a. Xen Tari)	mrt-aug	1	0,54	0	0	0	0	0,00	A	A	Rupsen (Wintervlinder)	7
Calypso	jan-dec	0,25	0,12	1	0	17	5	0,00	B	B	Wantsen, luizen en kevers	14
Cydia pomonella granulose virus (Madex plus, Cyd-X)	mrt-aug	1	0,00	0	0	0	0	0,00	?	A	Fruitmot	1
Cydia pomonella granulose virus (Madex plus, Cyd-X)	mrt-aug	0,1	0,00	0	0	0	0	0,00	?	A	Fruitmot	1
Decis EC	mrt-aug	0,2	0,01	0	0	119	51	0,00	B	C	Perenbladvlo, rupsen, luizen en wantsen	7
Dimilin	mrt-aug	0,3	0,08	3	3	x	69	0,00	C	B	Rupsen	14
Envidor	mrt-aug	0,4	0,10	8	2	0	0	0,01	?	?	Perenbladvlo, mijten en schildluis	14
Exomone C	mrt-aug	25 stuks	0,00	0	0	0	0	0,00	?	?	Fruitmot	nvt
Gazelle	mrt-aug	0,25	0,05	3	0	14	6	0,00	B	C	Luizen, wantsen en kevers	14
Insegar 25 WG	mrt-aug	0,3	0,08	0	0	95	41	0,00	A	B	Fruitmot en bladrollers (rupsen)	21
Kohinor 70 WG	mrt-aug	0,1	0,07	250	7	0	0	0,00	C	C	Luizen, wantsen en kevers	14
Masai 25 WG	mrt-aug	0,4	0,10	0	0	82	35	0,00	A	B	Fruitspintmijt	7
minerale olie (o.a. Olie-H, 11 E Olie)	mrt-aug	30	24,00	150	0	0	0	3,12	A	A	Wantsen en luizen (eieren)	voor bloei
Neemazal 1% ²	mrt-aug	3	0,03	0	0	0	0	0,00	B	A	Luizen	nvt
Nissorun spuitpoeder	mrt-aug	0,4	0,04	0	0	0	0	0,00	A	A	Fruitspintmijt	28
Pirimor	mrt-aug	0,5	0,25	125	2	193	83	0,06	A	A	Luizen	7
RAK 3	mrt-aug	500 ampullen	0,04	0	0	0	0	0,04	?	?	Fruitmot	nvt
Runner	mrt-aug	0,4	0,10	88	4	0	0	0,01	A	A	Fruitmot en bladrollers (rupsen)	14
Steward	mrt-aug	0,17	0,05	1	0	7	3	0,00	B	B	Fruitmot en bladrollers (rupsen)	7
Teppeki	jan-dec	0,14	0,07	0	0	0	0	0,00	A	A	Luizen	24
Vertimec Gold	mrt-aug	0,75	0,01	0	0	3	1	0,01	B	C	Fruitspintmijt en Perenbladvlo	28
						1% drift ³	1% drift ³					
2,4 D, Dicamba, MCPA (o.a. Aamis) ¹,²,³	mrt-aug	4	1,86	528	68	25	25	0,00	?	?	Aanwezige onkruiden	nvt
amitrol (o.a. Weedazol)	mrt-aug	10	2,50	0	0	10	10	0,40	?	?	Aanwezige onkruiden + zaadonkruiden	nvt
amitrol (o.a. Weedazol)	sept-feb	10	2,50	0	0	10	10	0,25	?	?	Aanwezige onkruiden + zaadonkruiden	nvt
Fusilade Max glufosinaat-ammonium (o.a. Finale SL 14, Basta 200)	mrt-aug	3	0,38	300	54	3	3	0,06	?	?	Aanwezige onkruiden	28
	mrt-aug	5	0,75	145	145	0	0	0,03	?	?	Aanwezige onkruiden	nvt
glyfosaat (o.a. Roundup)	mrt-aug	5	1,80	0	0	10	10	0,00	?	A	Aanwezige onkruiden	28

General: Effects of technique versus effects of spraying scedule!

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Social aspects:

- Focus on labour
  - Labour demand
    - Effects of mechanization/automation (spraying, pruning)
  - Techniques for harvesting

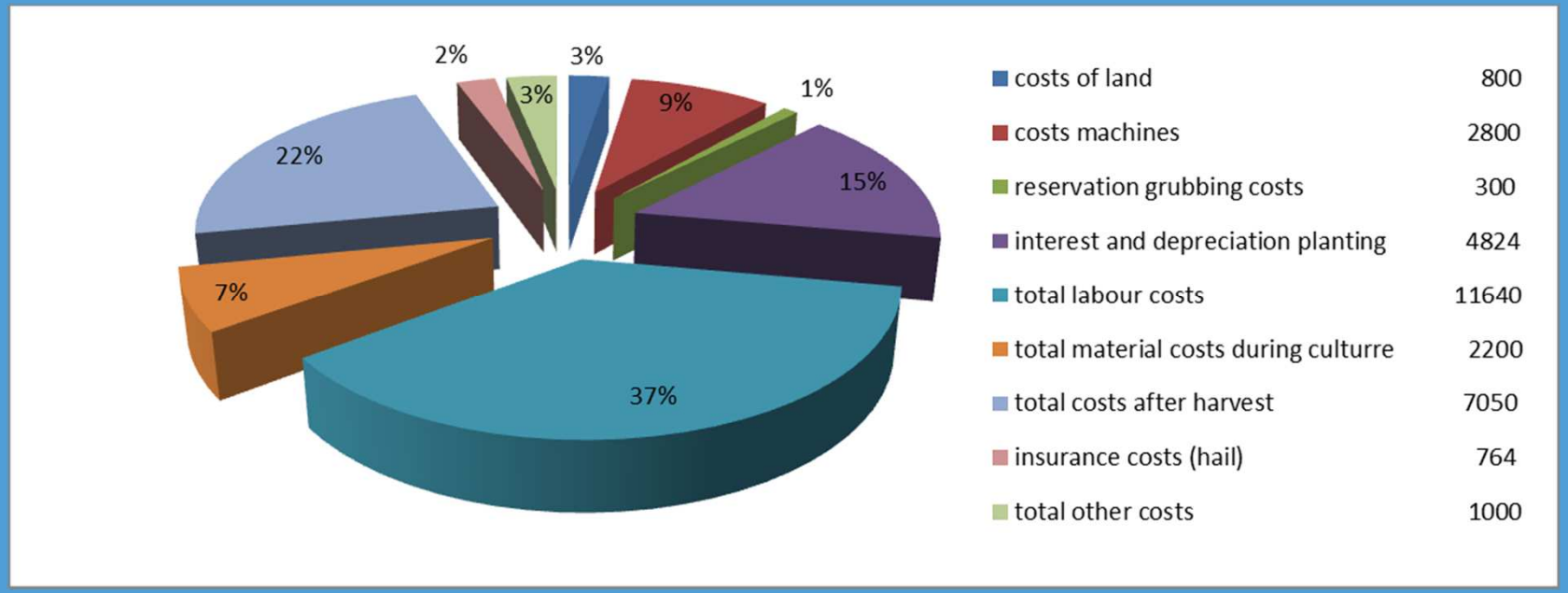



  - Labour conditions

    (bending, twisting, lifting, etc)

Economic aspects:

- Focus on labour



Economic aspects:

- Labour costs and labour liability affect mechanization

  - (costs per hour) x (# hours) = (processing costs)
  - Social aspects

Economic aspects:

- Focus on labour
  - Autonomous spraying
  - Multi-row sprayers
  - Mechanical thinning
  - Mechanical pruning

Autonomous spraying with KWH-CDH sprayer

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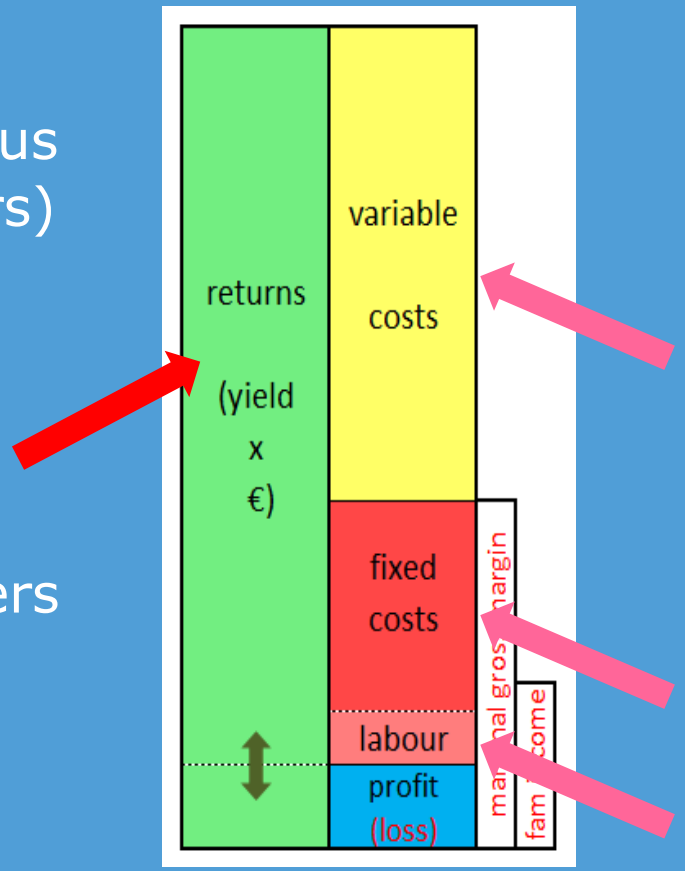
Economic aspects:

- Economic evaluation
  - Effects of spraying technique (multi-row sprayers, autonomous sprayers, drift reducing sprayers) on farmers income
  - Effects of spraying scheme on farmers income
  - Effects of lower selling prices, due to more residues, on farmers income.



What is the best sustainable choice for fruitgrower Westreenen?

Considering:

- Environmental aspects
- Social aspects
- Economical aspects

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