



A multi-location, long term and multi-factors network



The French National Apple Network “EcoPhyto Experimentation”
 Evaluation of innovative multi-site apple production systems, with the aim to reduce the use of pesticides.



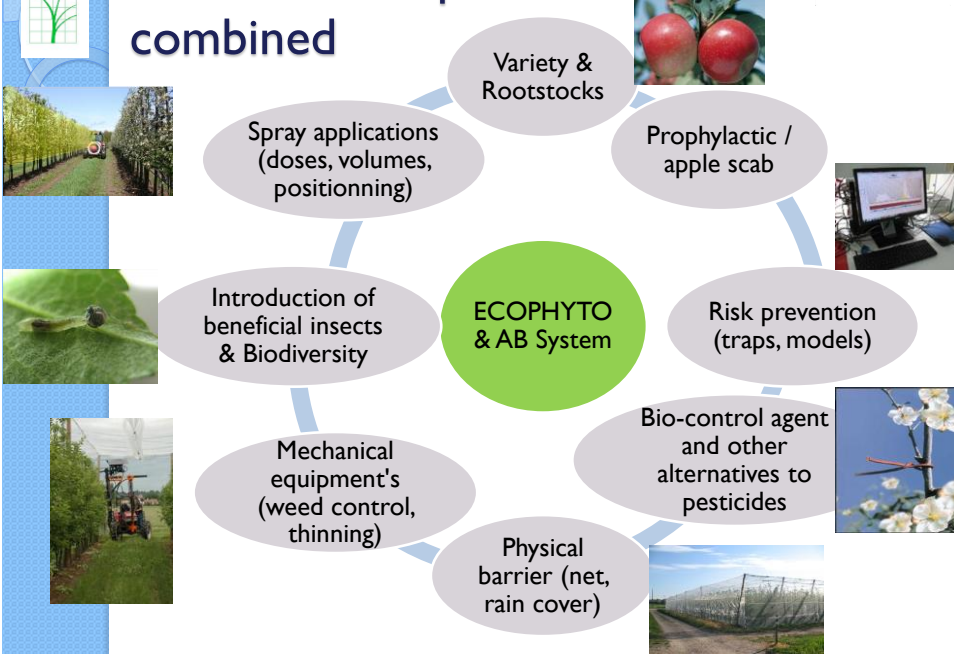
- **28 systems** from 500 to 5200 m²
- **6 seasons** (2012 – 2018)



Type of system	number	Varieties
Base system	9	Gala, Fuji, Golden, Granny, Ariane
ÉCOPHYTO 1 system	7	Gala, Fuji, Golden, Granny
ÉCOPHYTO 2 system	5	Ariane, Crimson Crisp
Organic system (AB)	7	Ariane, Akane, Crimson Crisp, Opal



Several techniques are combined





Chemical “TFI”^(*) reduction level (without Bio-control agent) : “Rt”



pesticides reduction (in %) / sensible variety	Max. 22 %	between 55 and 65 %	Superior to 80 %
Scab resistant (Rt) Season 2016	Adapted apple scab management to resistance varieties against apple scab. Possibility to reduce the number of fungicides on primary and secondary infections. Use of chemical fungicides.	Adapted apple scab management to resistance varieties against apple scab. Possibility to reduce the number of fungicides on primary and secondary infections. Use of “alternative” fungicides like bicarbonate, sulphur or limesulphur. <u>Two different situations :</u> - Important codling moth pressure : Alt’Carpo nets completed by chemical insecticides or - Low codling moth pressure : Combination of chemical and bio-control insecticides.	- Genetics and organic production with mating disruption or Alt’Carpo nets and some complementary Bio-control insecticides. or -Genetics and adapted doses, combined with Alt’Carpo nets and some complementary insecticides. or -Genetics, Alt’Carpo nets, but without codling moth pressure. The used fungicides are alternatives to chemical fungicides.
	Important codling moth pressure. The strategy is mostly based on chemical insecticides..		

^(*) treatment frequency index

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Chemical “TFI”^(*) reduction level (without Bio-control agent) : “St”



pesticides reduction (in %) / Base system sensible variety	Max. 8 %	Entre 18 et 32 %	Supérieur à 50 %
Sensible to scab (St) Season 2016	No or very low possibility to reduce the number of fungicides.	-Possibility to adapt the strategy to the apple scab risk on the primary and secondary infections. Use of “alternative” fungicides. -Reduced number of chemical insecticides with an Alt’Carpo nets. Or -Mating disruption with biocontrol insecticides.	-Rain cover and mating disruption with chemical and biocontrol insecticides Or -Rain cover and Alt’Carpo nets with limited insecticideuse. Or -adapted doses and Alt’Carpo nets.
	Alt’Carpo nets with complementary chemical treatments on the first generation.		

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Hurdles and limits

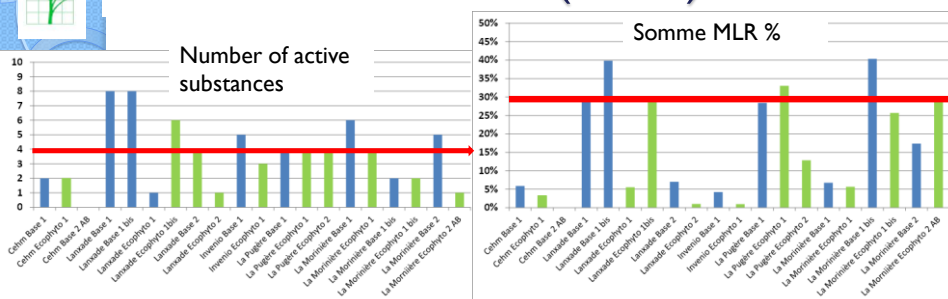


Type of system	commercial yield	Value of the chemical TFI (without biocontrol)	Plant protection cost (products & equipments)	Mechanisation costs	Hours for manual and mechanised work	Sanitary state of the orchard
Resistant + organic + Alt'Carpo	55 t/ha	0,32	< 1000 €/ha	< 760 €/ha	500 – 1000 h/ha	
Resistant + adapted doses + Alt'Carpo	25 t/ha	4,15	< 1000 €/ha	< 760 €/ha	< 500 h/ha	Because of Powdery mildew
Sensitive + adapted doses + Alt'Carpo	36 t/ha	7,25	< 1000 €/ha	< 760 €/ha	< 500 h/ha	Development of apple scab
Sensitive + rain cover + Alt'Carpo	30 t/ha	7,45	> 1500 €/ha	< 760 €/ha	500 – 1000 h/ha	Presence of Woolly aphids
Sensitive + rain cover + mating disruption	23 t/ha	13,49	> 1500 €/ha	< 760 €/ha	> 1000 h/ha	Because of Powdery mildew

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Detected residues (2016)



- Majority **between 1 and 4 actives substances** (1 case up to 6)
- **Fungicides** : Fludioxonil, boscalid, pyraclostrobine, dithianon, captane, dodine, dithiocarbamates, cupper.
- **Insecticides** : chlorantranilprole, tebufenozide, phosmet, flonicamid, acétamipride, spirotetramat.
- **Almost all at 10 % of the MLR**, except flonicamide at 15,6 %, cupper at 14 %, 22 and 30 %, dithianon at 18 % and $\sum \text{MLR \%} \leq 30 \%$.



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Thanks for your attention

Merci de votre attention

Action pilotée par le ministère chargé de l'agriculture, avec l'appui financier de l'Office national de l'eau et des milieux aquatiques, par les crédits issus de la redevance pour pollutions diffuses attribués au financement du plan Ecophyto 2018

