Solving Preharvest Fruit Drop by Understanding Abscission in HLB-Affected Citrus Trees: A Hormonal and Nutritional Approach

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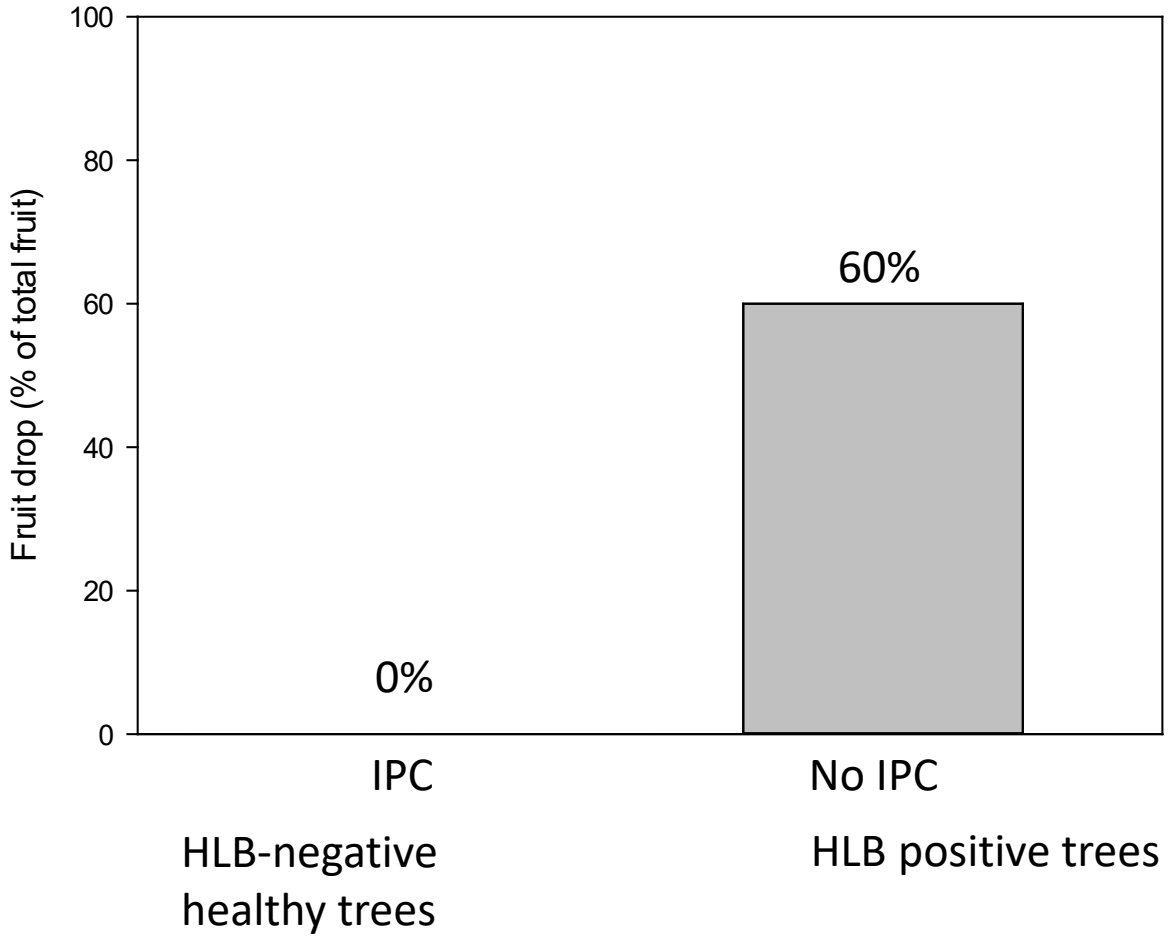
Fruit drop is a natural developmental process that may be influenced by other causes

FRUIT MATURATION

Increased **abscission** capacity

FRUIT DROP

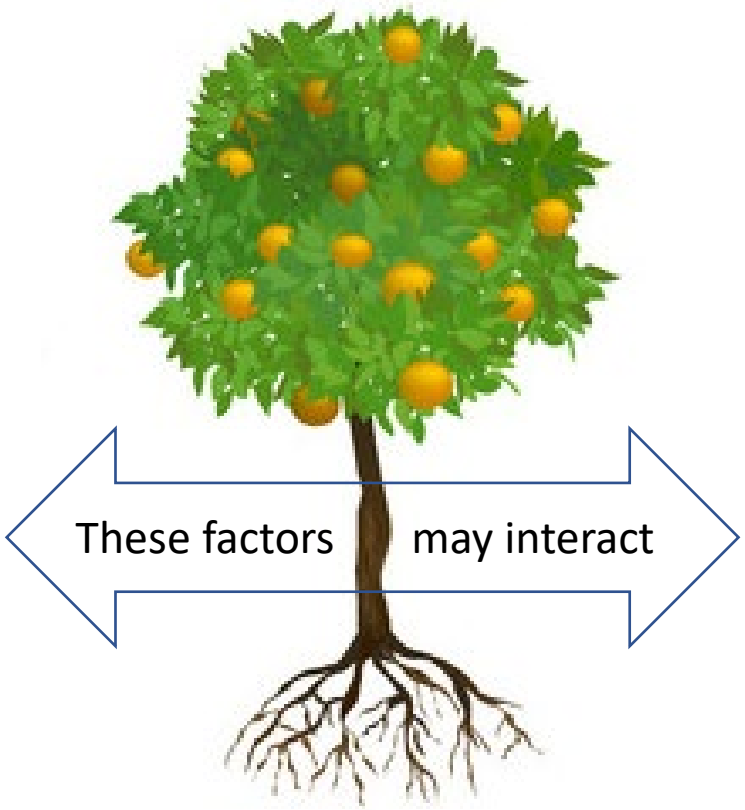
HLB is a major cause of increased preharvest fruit drop



Other possible causes?

Endogenous

- Loss of root density
- Altered hormonal balance
- Off blooms



Exogenous

- Other diseases
- Warmer and drier than normal weather

All related to HLB

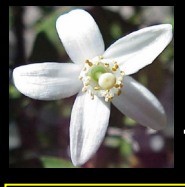
March

Late season
harvest
Dec-Jan

HAMLIN

Previous year's crop | Next year's crop

March



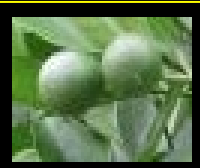
April-May

1 year for fruit development

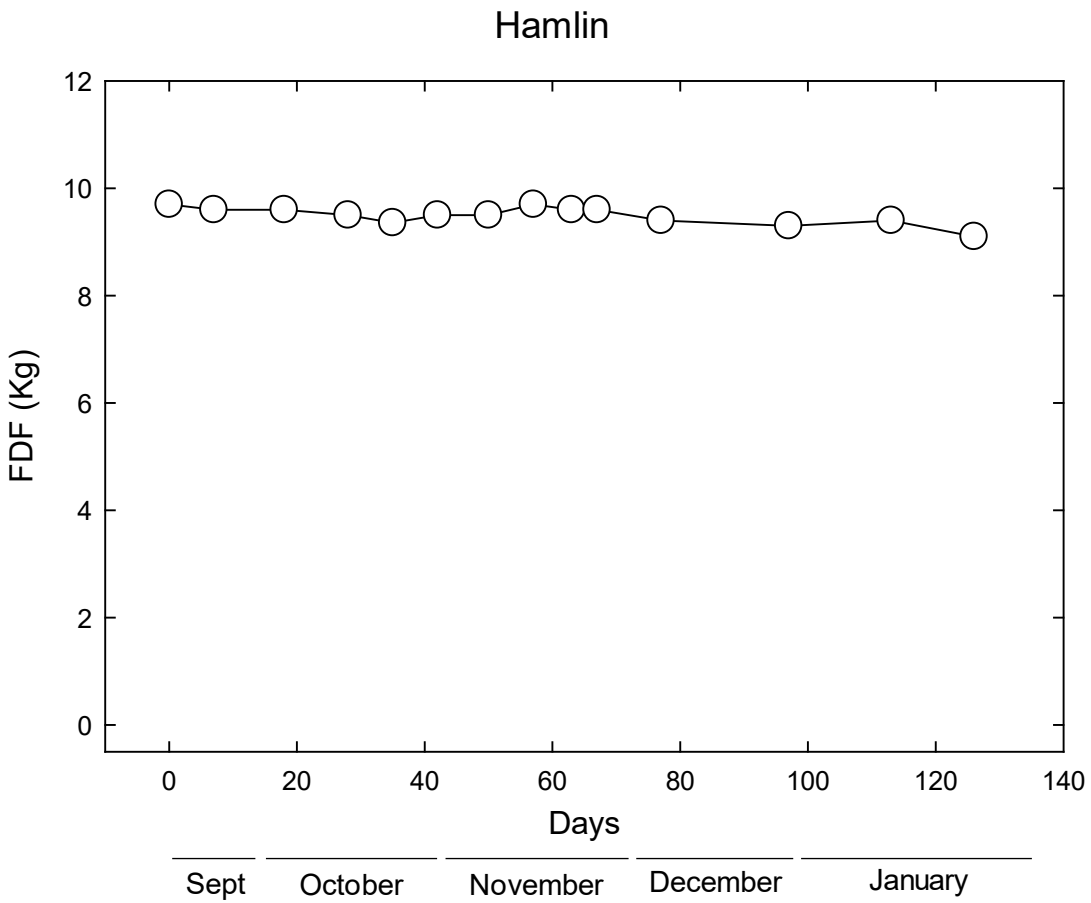
VALENCIA

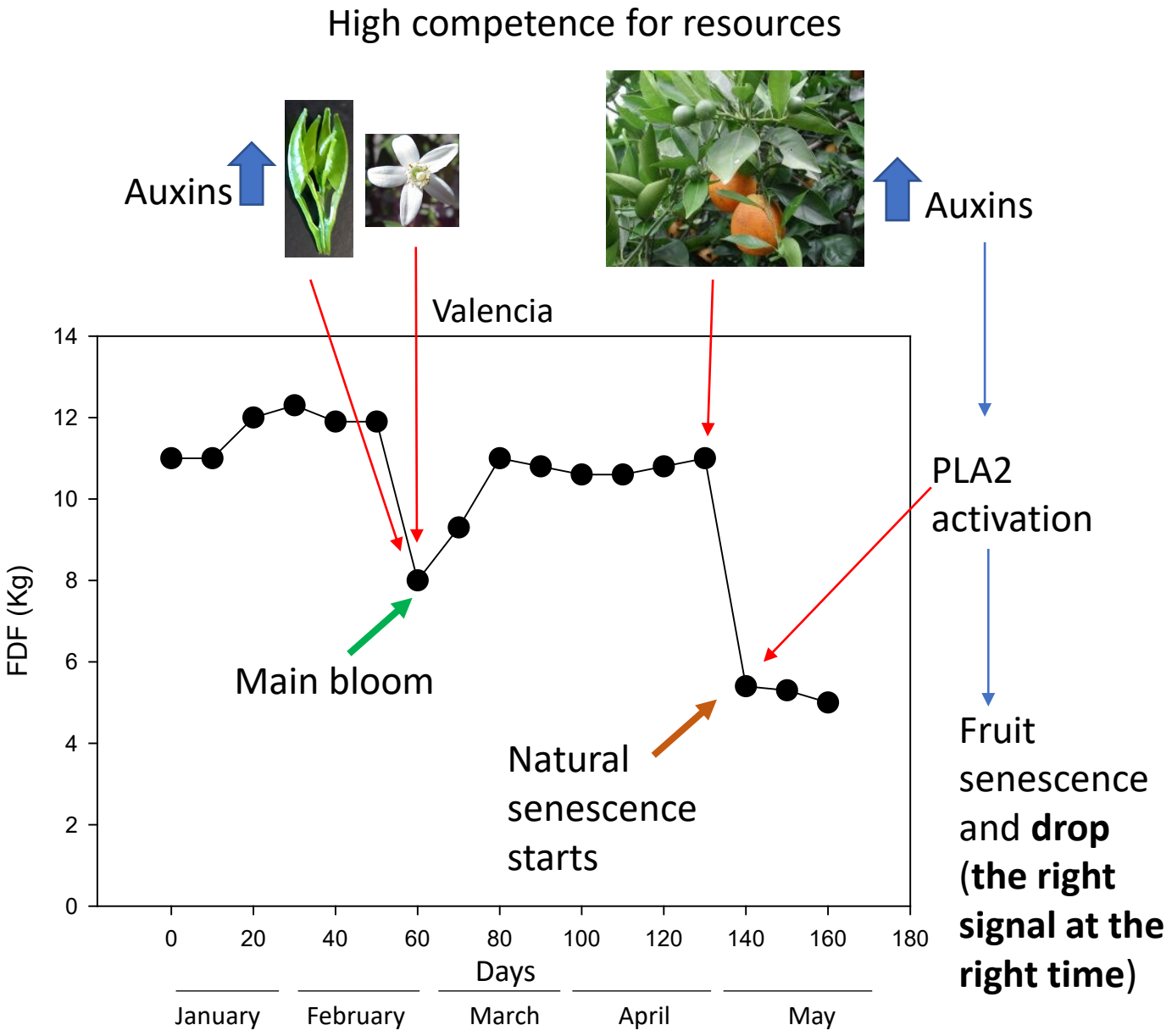
Previous year's crop

Next year's crop



Fruit retention in healthy Hamlin and Valencia trees





The situation under HLB

Environmental stress

Spring flush

Summer flush

Off blooms

Fall flush

Fall-Winter harvest

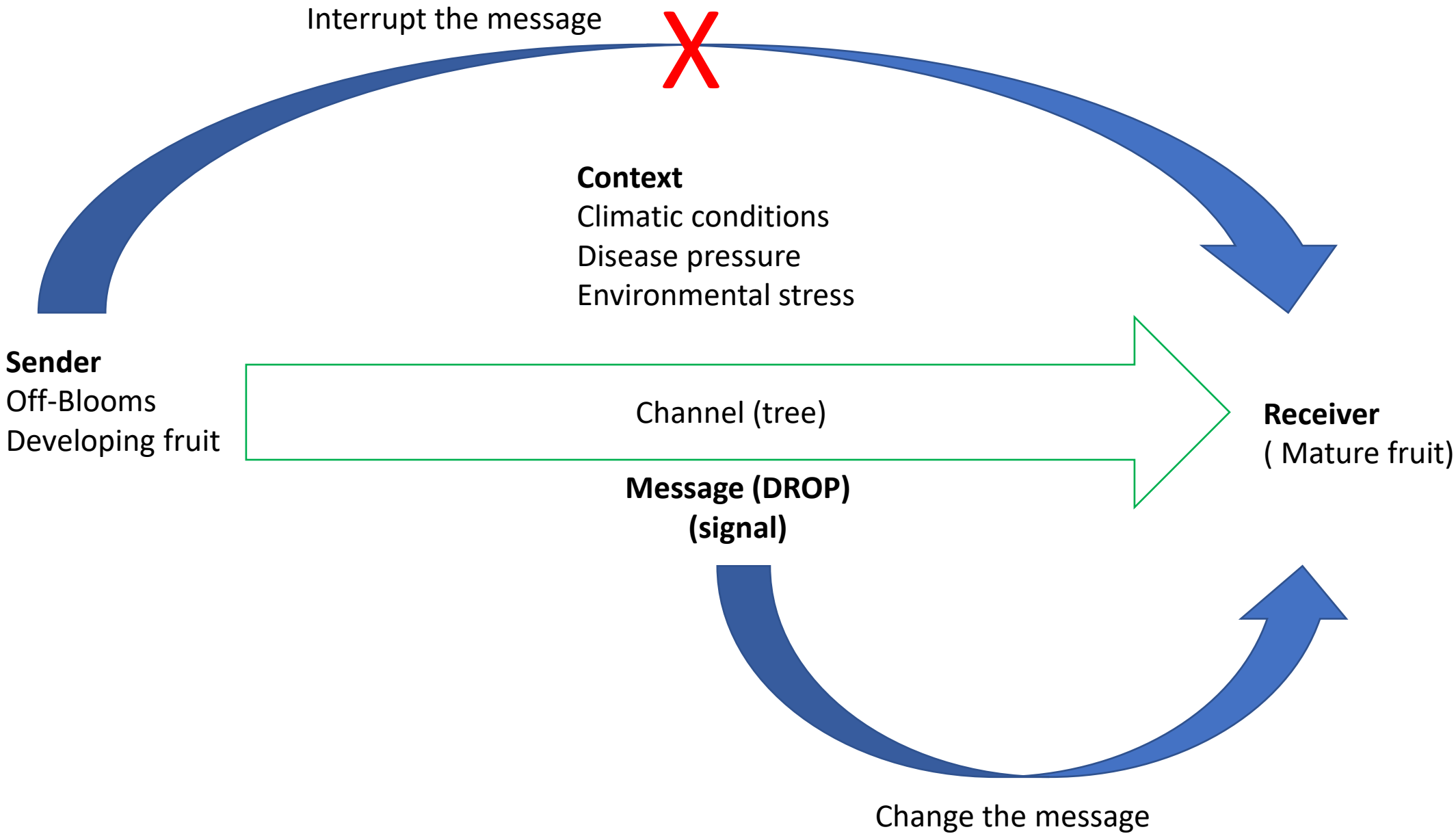
The wrong signal
at the wrong time

Massive preharvest fruit drop

HLB-infected Hamlin

Diversity of developmental stages affects hormonal interactions within the tree.

The wrong signal at the wrong time


Interrupt the message
Context
Climatic conditions
Disease pressure
Environmental stress
Sender
Off-Blooms
Developing fruit
Channel (tree)
Receiver
(Mature fruit)
Message (DROP)
(signal)
Change the message

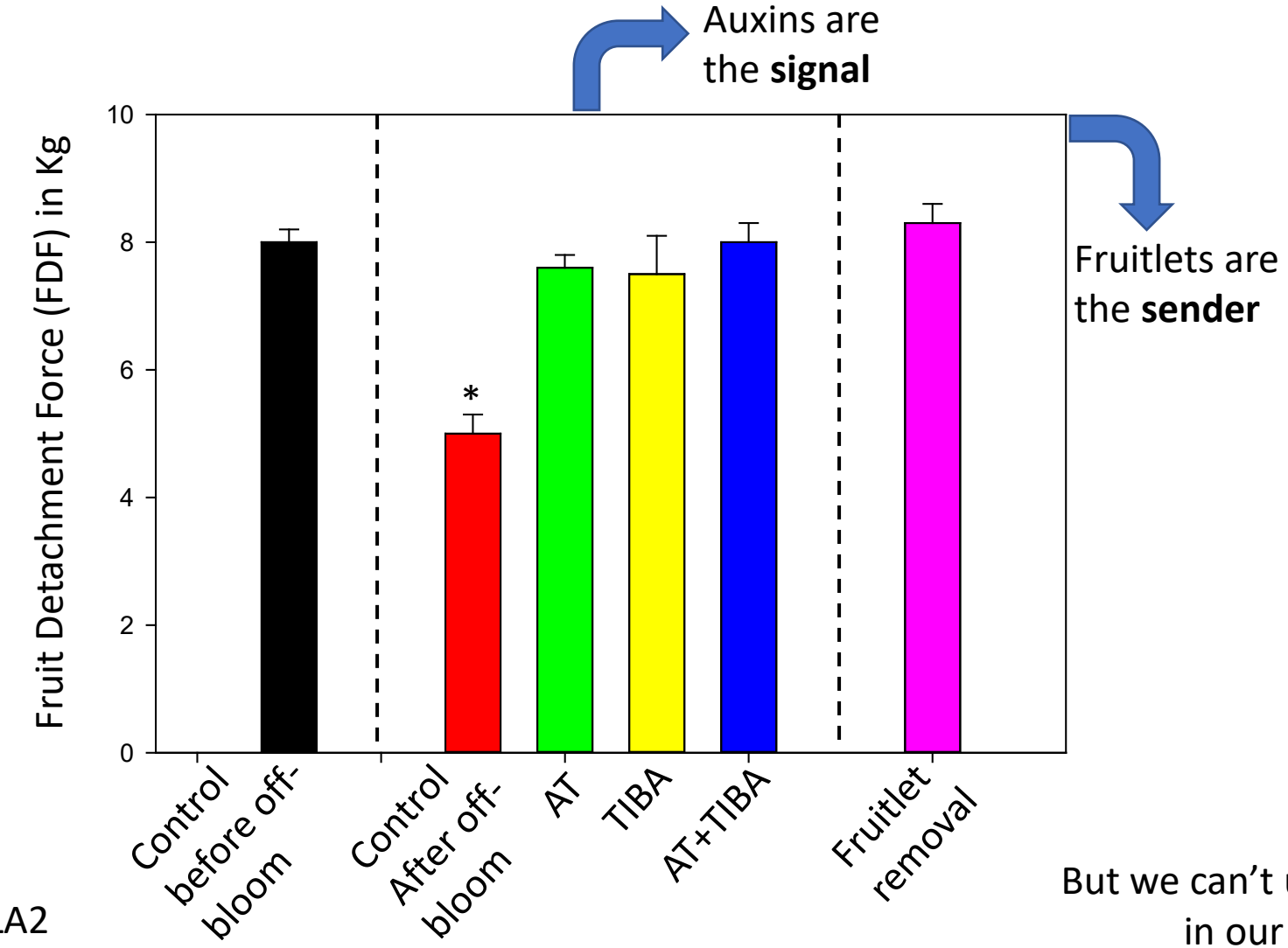
Interfering the message

Off bloom Fruitlets

Auxin

PLA2 induction

Mature fruit abscission

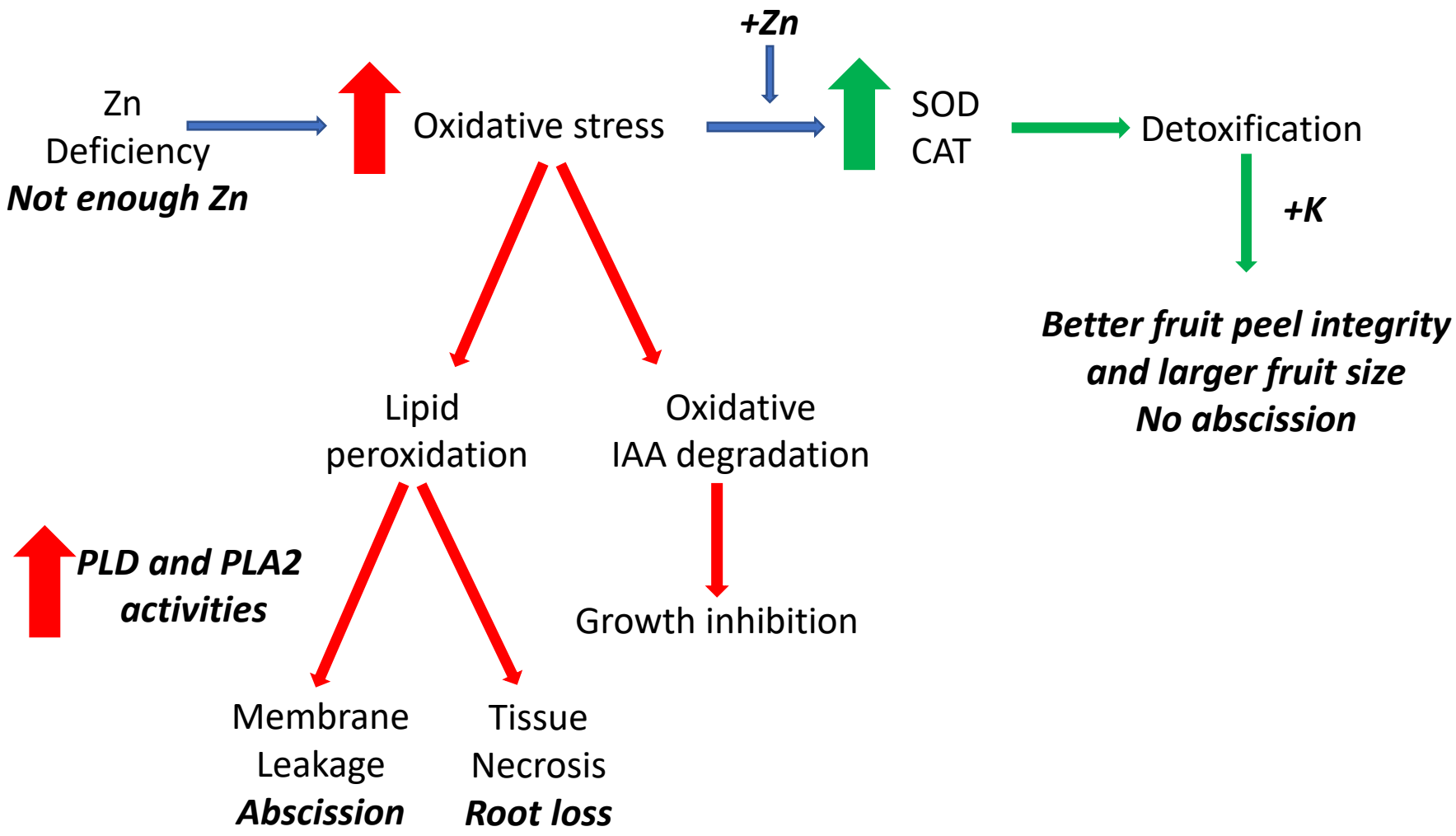


AT, competitive inhibitor of PLA2
TIBA, Auxin transport inhibitor

But we can't use AT or TIBA in our groves
What can we do?

Changing the message

Auxin levels and signaling, and stress alleviation, depend on Zn levels



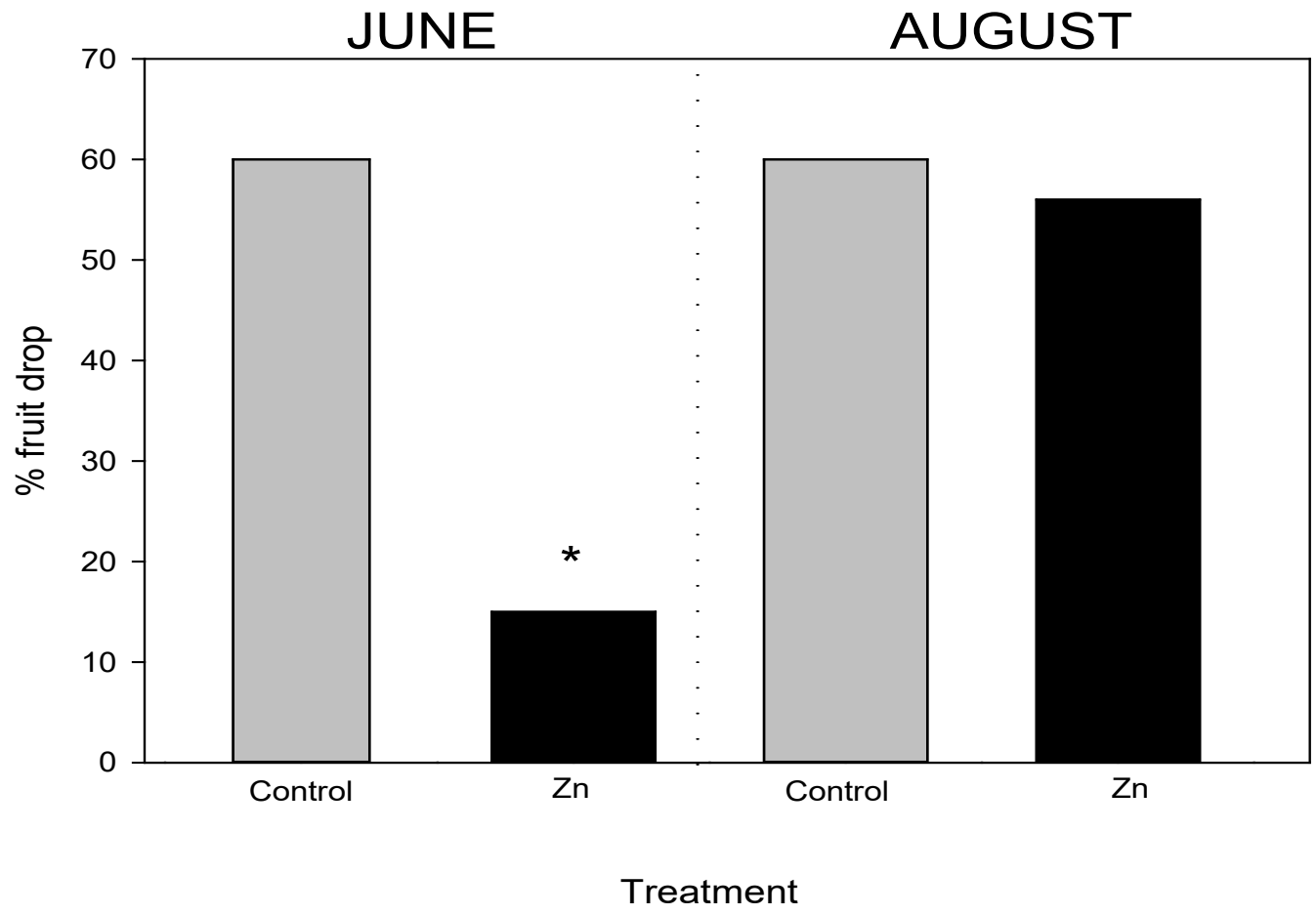
Zn treatment in Hamlin on Swingle and US942

- $ZnSO_4$ (50 grams per tree, foliar spray)
- K_2SO_4 (60 grams per tree, foliar spray)
- ZN+K combined treatment

3 applications:

- After fruit set and physiological drop (June)
- Fruit enlargement phase (July)
- Fruit color break (September)

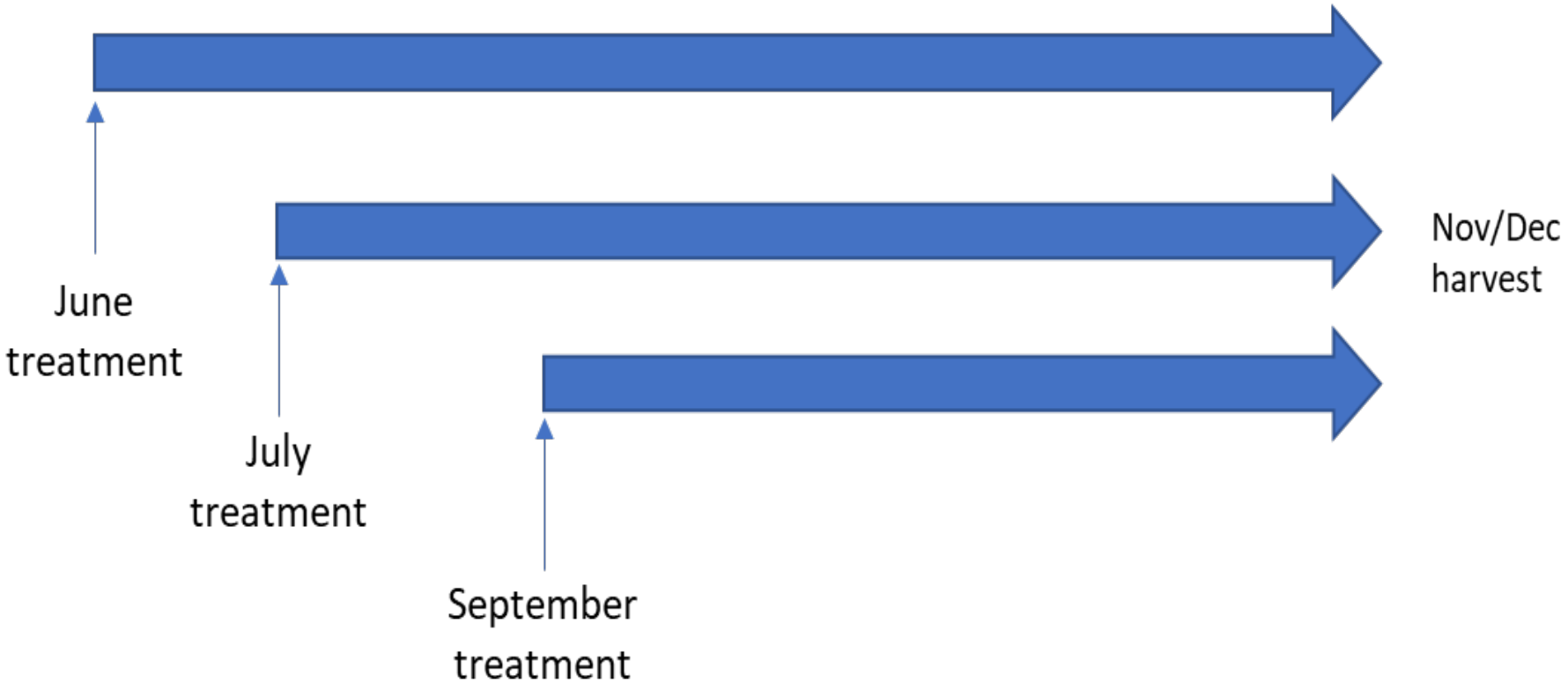
Seasonal effects of Zn treatment on fruit drop in Hamlin



YIELD (all treatment dates pooled)

	Hamlin on Swingle		Hamlin on US942	
	# fruit/4 trees	Boxes/acre	# fruit/4 trees	Boxes/acre
Control	**952**	**231**	**811**	**197**
Zn	**1029**	**256**	**885**	**216**

Maximizing the effect of our treatments



Conclusions

- We can improve fruit retention with feasible treatments than can be adopted now.
- These treatments may increase fruit yield and quality.
- Time of application is critical for treatment success. This must be defined for each variety and treatment and depends on the physiological status of the fruit.
- Planned work will allow to develop a management strategy to maximize effects of Zn and K treatments.

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