

**Improving smallholder farmer incomes through strategic market development
in mango supply chains in southern Vietnam**

**Annual Workshop
December 2020**

Activity 2.2

Alternative to Paclobutrazol and extending mango flowering study

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Activity 2.2

- ▶ Expanding seasonal flowering

Research questions

- ▶ What on-farm innovations are likely to generate the most significant impacts to reduce losses, increase productivity and quality outputs that will improve returns directly related to smallholder incomes?
- ▶ What innovations have the most cost-effective and positive impacts on productivity, losses, quality and harvest timing, leading to improved price and farmer incomes?
- ▶ What tools will support sharing of innovations with wider mango farming communities?
- ▶ What are the roles and responsibilities of the key local partners to ensure the innovation successes are mainstreamed within the communities in southern Vietnam?



Activity focus

- ▶ Evaluate alternative product to PBZ that could be used should to maintain high yields in Cat Hoa Loc should PBZ no longer be available
- ▶ Determine whether chemical inputs could be reduced using alternative gibberellin synthesis inhibitors
- ▶ Build capacity to evaluate orchard responses to chemical treatments that manipulate flowering and fruit production

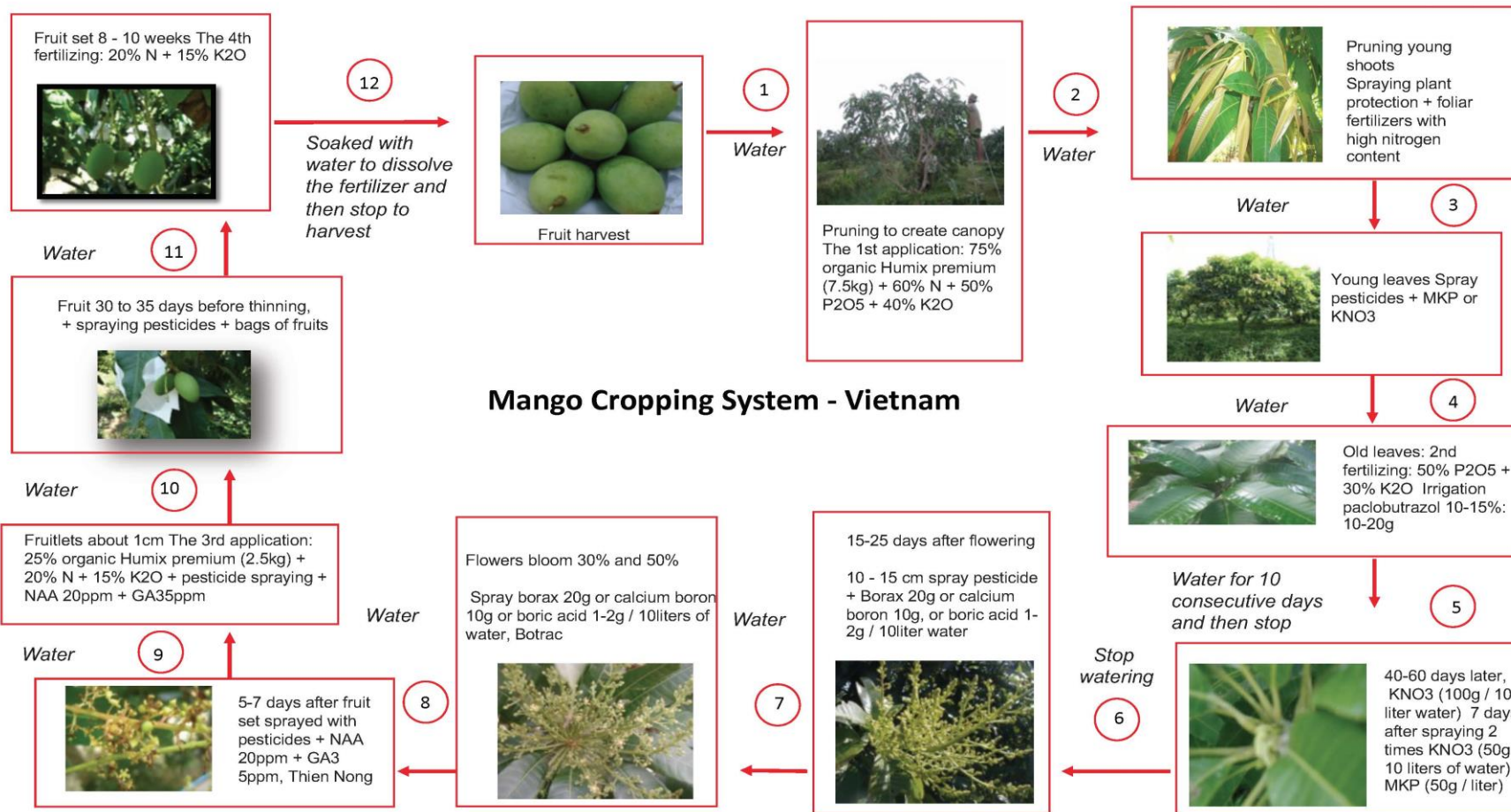
Background

- ▶ Production in southern Vietnam is PBZ dependent
- ▶ Used to reduce tree vigor, improve flowering and increase yield
- ▶ Soil application
- ▶ Farmer surveys indicate very high amounts are used
- ▶ Levels of PBZ affect fruit development, ripening and fruit quality
- ▶ Focus - to reduce chemical inputs in Vietnamese farming

Issues with PBZ

- ▶ Widely applied in excessive levels
- ▶ Affects above and below ground tree development
 - reduces root growth
 - modifies nutrient uptake
- ▶ Potentially contaminates ground water and soil
- ▶ Microbes develop rapidly to break down PBZ, especially with added organic matter (manure) and fertiliser application (NPK)

Crop cycle



Stages

- 1 - pruning
- 2 - flush
- 3 - GB inhibitor
- 3-4 - leaf condition
- 5 - floral induction
- 6-9 - set & retention
- 10 - bagging
- 11 - final fertiliser
- 12 - harvest

Prohexadione calcium (Regalis Plus ®)


- ▶ Inhibits late stage gibberellin synthesis
- ▶ Successfully used on mangoes in Mexico
- ▶ Short lived with quick breakdown in the soil
- ▶ No benefit from excessive application
- ▶ Widely used internationally in pome fruit

Uniconazole (Stoplant 5%)

- ▶ Acts at the same stage of gibberellin synthesis as PBZ to inhibit production
- ▶ Shown to be effective in Vietnam as a soil applied inhibitor
- ▶ Can be applied as a foliar treatment requiring reduced chemical inputs
- ▶ Excessive use may affect flower fertility
- ▶ Used as foliar treatments in mango and avocado

- ▶ Proposed as - fully randomised block design with 4 treatments and six replicates
- ▶ Within in each block the position of the treatments was randomised
- ▶ The results checked for normality, transformed as required and analysed by ANOVA
- ▶ Note - 3 treatments were blocked and repeated 6 times and analysed by T-test
- ▶ Treatments
 - Control (untreated)
 - Paclobutrazol ($1\text{g}\cdot\text{m}^{-1}$ canopy diameter)
 - Prohexadione Calcium (single spray $1500\text{ mg}\cdot\text{l}^{-1}$)
 - Uniconazole ($4\text{g ai}\cdot\text{tree}^{-1}$)

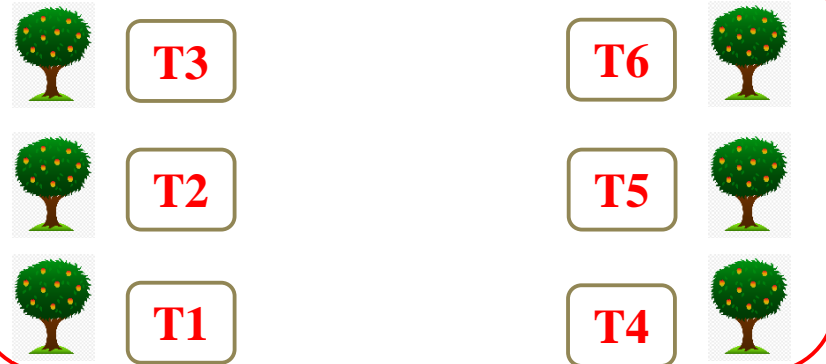
Schedule 2020 - 2021



	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Prune										
MKP										
Growth regulators										
KNO ₃										
Flowering										
Bagging										
Harvest										
Final Report										

SOFRI farm Research design

**Paclobutrazol
treatment**



**Uniconazole
treatment**

**Pro – Cal
treatment**



SOFRI farm



	Diameter (m)			Height (m)	No. of shoots	No. of infected shoots by Pests
	W-E	S-N	Avg.			
Tree 1	2.7	3	2.85	2.5	171	9
Tree 2	2.6	2.7	2.65	2.2	141	7
Tree 3	2.5	2.6	2.55	2.3	139	6
Tree 4	2.6	2.95	2.78	2.3	152	10
Tree 5	2.2	2.63	2.42	2.3	132	9
Tree 6	2.3	2.9	2.60	2.6	144	17
Tree 7	3.2	2.9	3.05	2.6	213	5
Tree 8	2.7	2.4	2.55	2.2	124	8
Tree 9	2.9	2.5	2.7	2.6	144	10
Tree 10	2.6	2.4	2.5	1.9	130	7
Tree 11	2.7	3.3	3.0	2.3	109	6
Tree 12	2.3	1.9	2.1	2.1	123	17
Tree 13	2.5	3.1	2.8	2.5	163	7
Tree 14	2.5	3.3	2.9	2.4	146	7
Tree 15	3.7	3	3.35	2.4	215	6
Tree 16	2.1	2.6	2.35	2.2	115	3
Tree 17	2.2	2.4	2.3	2.3	91	4
Tree 18	3.3	2.9	3.1	2.6	168	7
Tree 19	2.5	2.9	2.7	2.2	138	5

Outputs & outcomes

Outputs

- ▶ The effects of growth inhibitors on flower development assessed
- ▶ The effects of growth inhibitors on yield and fruit quality assessed
- ▶ Comparisons of production using alternative growth inhibitors with results using paclobutrazol made.

Outcomes

- ▶ Recommendations for alternative growth inhibitors as production substitutes for high value markets