

Study of bud break in 'Hass' avocado



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Objectives

- Increase bud break of floral buds using plant bioregulators (PBRs) and/or apical bud removal.
- Increase floral shoot number, specially after a heavy year (ON crop).
- PBRs tested: Benzyladenine (BA), Gibberellins (GA) and Hydrogen cyanamide (HDC).
- Trials *in vivo* and *in vitro* and treatments applied just before bud break.

In vivo (Irvine, CA)

FEB → ON crop shoots (spring)
OFF crop shoots (pred. sum)

Spraying

- BA: 25, 50 or 100 mg/L
- GA: 25, 50 or 100 mg/L
- HDC: 10 or 20 mg/L
- Rinse
- Control

Apical bud removal

FEB → ON crop shoots (spring)
OFF crop shoots (pred. sum)

- Each month: Feb, Mar, Apr, May

In vitro (growth room)

MAR → ON crop shoots (spring)
OFF crop shoots (pred. sum)

Excised shoots immerse in solutions

- BA: 0.3, 0.15 or 0.075 mM
- GA: 5, 2.5 mM
- HDC: 0.125, 0.063, 0.032 mM
- Rinse
- Control

For all this trials, we recorded the type of shoot that underwent bud break

In vivo

Spraying

BA increased apical floral bud break (no lateral) in OFF crop

Apical bud removal

Strong vegetative growth

Both

Apical buds on OFF crop shoots preduced predominantly floral shoots.

PBRs had no effect on shoots from ON crop trees.

In vitro

Excised shoots

BA increased lateral floral (and V) bud break when the apical bud was removed.

Effect of the presence or absence of the apical bud and PBRs on bud break of floral and vegetative lateral buds on excised 'Hass' avocado shoots without fruit (OFF trees) and with fruit (ON trees) in March.

Treatments	Lateral buds	
	Shoots without fruit	Shoots with fruit
Apical bud removed		
--- No. of floral buds per 10 shoots ---		
5 mM GA ₃	0 f	0 a
2.5 mM GA ₃	0 f	0 a
0.125 % HDC	0 f	0 a
0.063 % HDC	0 f	0 a
0.032 % HDC	0 f	0 a
0.3 mM BA	3 def	0 a
0.15 mM BA	7 bcd	0 a
0.075 mM BA	1 ef	0 a
Rinse + dH ₂ O	0 f	0 a
dH ₂ O only	0 f	0 a
----- No. of veg buds per 10 shoots -----		
5 mM GA ₃	0 f	0 a
2.5 mM GA ₃	0 f	0 a
0.125 % HDC	0 f	0 a
0.063 % HDC	0 f	0 a
0.032 % HDC	0 f	0 a
0.3 mM BA	0 f	0 a
0.15 mM BA	1 ef	0 a
0.075 mM BA	15 a	0 a
Rinse + dH ₂ O	10 b	0 a
dH ₂ O only	5 cde	1 a
P-value	<0.0001	0.4746

Effect of PBRs applied to the foliage of 'Hass' avocado shoots without fruit (OFF trees) and with fruit (ON trees) in February on bud break of floral and vegetative apical and lateral buds.

Treatments	Apical buds		Lateral buds			
	Floral	Veg	Spring shoots		Sum/fall shoots	
			Floral	Veg	Floral	Veg
----- No. of buds that broke per 10 shoots -----						
Shoots without fruit						
25 mg/L BA	8 a	1 cd	6 a	0 a	0 a	2 a
50 mg/L BA	7 a	1 cd	5 a	0 a	0 a	3 a
100 mg/L BA	5 ab	2 bcd	3 a	2 a	1 a	3 a
25 mg/L GA ₃	5 ab	1 cd	3 a	0 a	0 a	8 a
50 mg/L GA ₃	5 ab	0 d	2 a	1 a	1 a	0 a
100 mg/L GA ₃	5 ab	1 cd	0 a	0 a	1 a	0 a
10 mg/L HDC	3 bc	1 cd	0 a	0 a	4 a	3 a
20 mg/L HDC	5 ab	1 cd	2 a	0 a	0 a	3 a
dH ₂ O	3 bc	4 abc	0 a	0 a	5 a	4 a
Shoots with fruit						
25 mg/L BA	3 bc	5 ab	0 a	2 a	-y	-
50 mg/L BA	1 c	5 ab	0 a	0 a	-	-
100 mg/L BA	1 c	6 a	0 a	0 a	-	-
25 mg/L GA ₃	3 bc	2 bcd	0 a	1 a	-	-
50 mg/L GA ₃	0 c	5 ab	0 a	0 a	-	-
100 mg/L GA ₃	1 c	4 abc	1 a	0 a	-	-
10 mg/L HDC	1 c	2 bcd	0 a	0 a	-	-
20 mg/L HDC	0 c	2 bcd	0 a	1 a	-	-
dH ₂ O	3 bc	4 abc	0 a	1 a	-	-
P-value	0.000	0.019	0.671	0.558	0.423	0.700

Conclusions

- Positive effect of BA in enhancing floral bud break.
- No precocity of bud break was shown.
- No response of HDC. High toxicity.
- Rinse treatment accelerated bud break (data not shown).
- Use of excised shoots for studying hormonal behavior of 'Hass' avocado.
- Timing of PBRs application of this study suggest that is not the best time to do it.

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