

Document downloaded from:

<http://hdl.handle.net/10251/123275>

This paper must be cited as:

Gammoudi, N.; San Pedro-Galan, T.; Ferchichi, A.; Gisbert Domenech, MC. (2018). Improvement of regeneration in pepper: a recalcitrant species. *In Vitro Cellular & Developmental Biology - Plant*. 54(2):145-153. <https://doi.org/10.1007/s11627-017-9838-1>



The final publication is available at

<http://doi.org/10.1007/s11627-017-9838-1>

Copyright Springer-Verlag

Additional Information

Table 1. Percentage of explants with buds (B) or callus (C), for cotyledonary and hypocotyl explants from eight cultivars of pepper (AVA-8, VCA-116, cv.25, cv.27, cv.28, cv.31, cv.32, and cv.34) after 15 d of culture on shoot induction medium (SIM) or SIM supplemented with silver nitrate at 58.9 μ M (SIM+SN).

Factor	% of explants with buds (B)		% of explants with callus formation (C)	
	Cotyledonary explants	Hypocotyl explants	Cotyledonary explants	Hypocotyl explants
Genotype				
cv. AVA-8	87.5 ab	73.7 a	60.0 c	50.0 a
cv.25	88.5 ab	42.5 b	63.2 c	50.5 a
cv.27	76.2 b	73.7 a	63.7 c	66.2 a
cv.28	94.8 a	55.4 ab	74.2 bc	62.5 a
cv.31	86.2 ab	57.5 ab	85.6 ab	65.0 a
cv.32	93.2 a	53.6 ab	93.4 a	56.2 a
cv.34	96.2 a	78.9 a	90.0 ab	50.4 a
cv.VCA-116	87.8 ab	52.5 ab	72.2 bc	52.5 a
Organogenic Medium				
SIM	96.7 a	93.8 a	97.4 a	98.6 a
SIM+SN	80.9 b	28.2 b	53.2 b	14.8 b
ANOVA				
Genotype	0.0085	0.0010	0.0000	0.0073
SN	0.0000	0.0000	0.0000	0.0000
Genotype x SN	0.0005	0.0616	0.0000	0.0138

Values followed by the same letter are homogeneous at 5% according to Tukey's test.

Table 2. Percentage of oxidation and regeneration (buds that develop into plants) 20 d after transfer to the elongation medium: BM or BM supplemented with ACC (34.5 μ M) or GA₃ (2.9 μ M).

Factor	% of explants with oxidation symptoms		% of explants with regeneration (R)	
	Cotyledonary explants	Hypocotyl explants	Cotyledonary explants	Hypocotyl explants
Genotype				
cv. AVA-8	9.2 b	0	4.2 c	25.9 b
cv.25	26.7 a	0	18.8 bc	43.4 ab
cv.27	7.5 b	0	22.5 ab	40.6 ab
cv.28	9.2 b	0	25.8 ab	26.7 ab
cv.31	9.2 b	7.5	38.3 a	56.7 ab
cv.32	25.8 a	2.5	18.3 bc	26.7 ab
cv.34	11.7 b	0	16.7 bc	58.6 a
cv.VCA-116	2.5 b	0	21.7 ab	18.4 b
Organogenic Medium in origin (procedence)				
SIM	22.7 a	0	3.1 b	19.6 a
SIM+SN	2.7 b	1.7	38.4 a	54.6 b
Elongation Medium				
BM	3.8 b	0	14.6 b	22.2 b
ACC	32.7 b	0.8	14.5 b	26.6 b
GA ₃	1.9 b	0.8	33.5 a	62.6 a
ANOVA				
Genotype (G)	0.0000	-	0.0000	0.0061
Organogenic induction medium in origin (OM)	0.0000	-	0.0000	0.0000
Elongation medium (E)	0.0000	-	0.0000	0.0000
G x OM	0.0002	-	0.0000	0.0021
G x E	0.0014	-	0.1183	0.0286
OM x E	0.0000	-	0.0015	0.0556

Values followed by the same letter are homogeneous at 5% according to Tukey's test.

Table 3 Frequency of buds (B) and callus induction (C) in explants of cotyledons (C) and hypocotyls (H) directly cultured in SIM supplemented with SN (0) or transferred to SIM with SN after seven d of culture in SIM (7). In both treatments, half of the explants were dark incubated for seven d (D) and the other half were incubated under standard conditions (S). The *Capsicum* genotypes AVA-8, cv.28, cv.27, and cv.34 were evaluated.

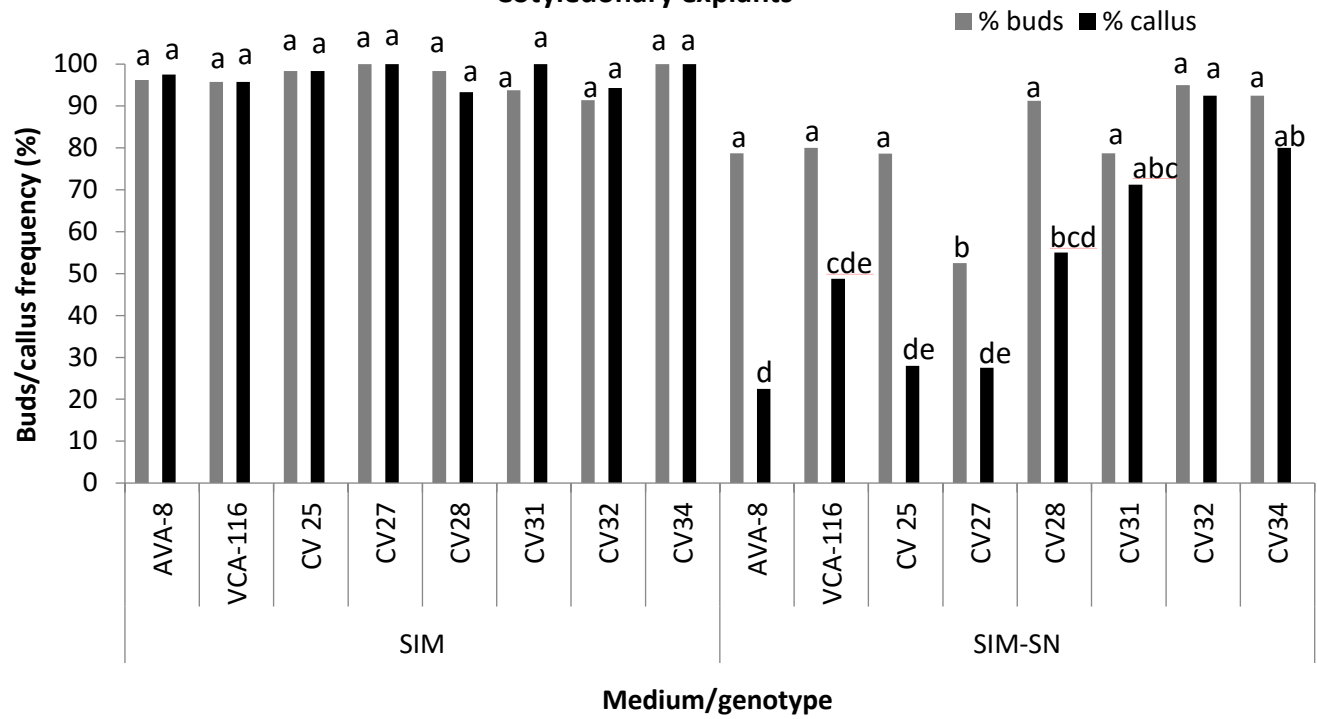
Factor	% of explants with buds (B)		% of explants with callus formation (C)	
	Cotyledonary explants	Hypocotyl explants	Cotyledonary explants	Hypocotyl explants
Genotype				
cv. AVA-8	86.2 b	76.2 ab	82.5 b	66.2 c
cv.27	100.0 a	71.9 b	95.0 ab	87.5 ab
cv.28	93.5 ab	90.6 a	98.7 a	98.1 a
cv.34	87.5 b	82.3 ab	87.5 ab	82.2 b
Silver nitrate (SN)				
SIM+SN	90.0 a	69.9 b	88.1 a	73.1 b
From SIM to SIM + SN at 7 days	93.6 a	90.6 a	93.7 a	94.0 a
Light conditions				
Standard photoperiod	89.4 a	82.4 a	88.1 a	88.0 a
Dark (first 7 days)	94.2 a	78.1 a	93.7 a	79.0 b
ANOVA				
Genotype (G)	0.0086	0.0120	0.0140	0.0000
Light conditions (LC)	0.2441	0.3572	0.1354	0.0400
SN	0.1187	0.0000	0.1354	0.0000
G x LC	0.1871	0.4541	0.5072	0.2493
G x SN	0.1837	0.5174	0.2558	0.1093
LC x SN	0.0985	0.1194	0.1354	0.4099

Values followed by the same letter are homogeneous at 5% according to Tukey's test.

Table 4 Number of shoots that developed into plants: their growth (height, in cm), rooting percentage, and root length (cm)

Factors	No. of developed plants	Plant height (cm)	No. of rooted plants (%)	Root length (cm)
cv. AVA8	19	3.5	16 (84.2)	5.3
cv. 27	39	4.4	21 (53.8)	7.7
cv. 28	132	1.5	49 (37.1)	9.9
cv. 34	30	2.6	7 (23.2)	13.8
H (Hypocotyl explants)	185	2.2	74 (40.0)	9.2
C (Cotyledonary explants)	35	2.6	19 (54.3)	7.1
SN (at d 0)	92	3.0	57 (61.9)	10.2
SN (at d 7)	128	1.8	36 (28.1)	6.9
S (Standard incubation)	128	2.2	55 (43.0)	9.3
D (First 7 d in dark)	92	2.4	38 (41.3)	8.4
CS0	6	2.9	4 (66.6)	9.2
CS7	8	2.7	5 (62.5)	7.7
CD0	7	3.3	5 (71.4)	8.6
CD7	14	2.1	5 (35.7)	5.6
HS0	52	2.9	30 (57.7)	10.7
HS7	62	1.6	16 (25.8)	7.0
HDO	27	3.3	18 (66.7)	10.0
HD7	44	1.8	10 (22.7)	6.9

Cotyledonary explants



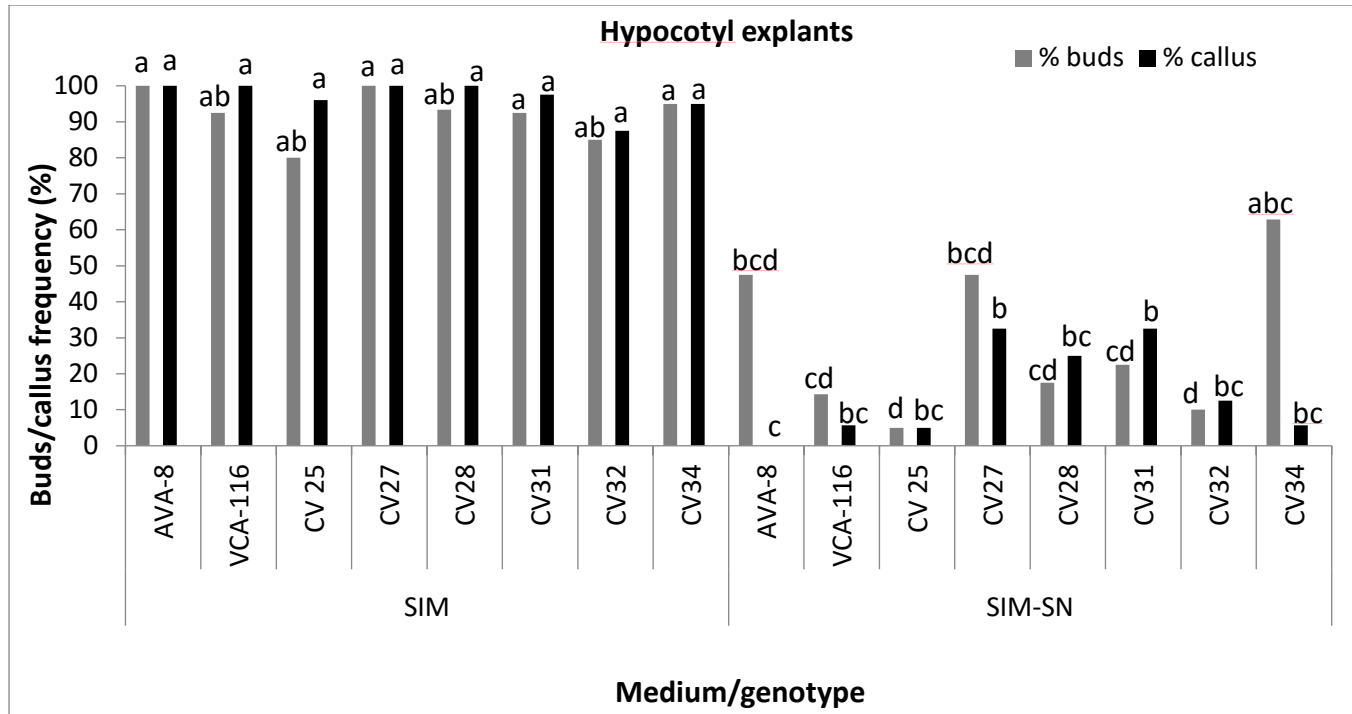


Figure 1. Buds induction and callus formation frequencies in cotyledonary and hypocotyl explants cultivated in SIM medium (with 22.2 μ M 6BA and 5.7 μ M IAA), or in SIM medium supplemented with 58.9 μ M SN (SIM-SN), after 15 d of culture. Values followed by the same letter and color are homogeneous at 5% according to Tukey's test.



Figure 2. Organogenesis in *Capsicum*: buds induction in SN-free medium (SIM) from hypocotyls (a) and cotyledons (b); buds induction in SIM+SN added at 0 d of culture, from hypocotyls (c) and cotyledons (d); cotyledon oxidation in ACC-supplemented medium (e); proliferation from hypocotyls in medium with GA₃

(2.9 μM) (f); formation of rosette-grouped shoots from hypocotyls (g); elongation in medium with GA_3 (1.4 μM) and AC (h); and acclimation of *in vitro*-plants in the growth chamber (i).