

Supplementary Materials

Table S1. Medium composition used for somatic embryogenesis of elite Indonesian cacao. DKW= Driver and Kuniyuki (1984); MS= Murashige and Skoog; 2,4-D= 2,4-Dichlorophenoxyacetic acid; 2,4,5-T= 2,4,5-Tricholophenoxyacetic acid.

Ingredients	Primary Embryogenesis		Secondary Embryogenesis	
	Induction (IND1)	Expression (INDexp)	Induction (CM2)	Expression
DKW basal (g)	5.585	5.585	-	-
MS macro (g)	-	-	1.652	1.652
MS micro (g)	-	-	-	-
DKW micro 100X (ml)	-	-	10	10
DKW vitamins 100X (ml)	1	1	1	1
Amino acids 1000X (ml)	1	1	1	-
2,4-D (mg/L)	2	-	-	-
2,4,5-T (mg/L)	-	-	1	-
Kinetin (mg/L)	0,25	-	-	-
Proline (mg/L)	-	-	1	-
Adenine (mg/L)	-	-	0.25	-
Glucose (g/L)	30	30	30	-
Sucrose (g/L)	-	-	-	40
pH	5,8	5,8	5,8	5,8
Gelrite (g/L)	3 g	3 g	3 g	3 g

Table S2. Induction of primary somatic embryo on petal and staminode explants on modified IND media with different concentration of 2,4-D on the percentage of callus-producing embryos, the number of callus-producing embryos, and total embryos. Embryogenic response was determined after 8 weeks of culture on INDexp media.

Clones	Explant	2,4-D (mg L ⁻¹)	Average of calluses Producing SEs (%)	Number of calluses producing SEs	Total number SEs
SUL1	Petal	1	0c ± 0	0	0
	Staminode		3,3 c ± 4,7	1	5
	Petal	2	0 bc ± 0	0	0
	Staminode		6,7 b ± 4,7	2	14
SUL2	Petal	1	10 bc ± 8,1	3	Browning
	Staminode		16,67 ab ± 4,7	5	13
	Petal	2	13.3 abc ± 4,7	4	17 direct SE, browning
	Staminode		23.3 a ± 4,7	6	24

Data are the means of three replications, ± standard deviation. Mean within columns with the same letter are not significantly different at $p < 0,05$ according to the Tukey B multiple range test (one way ANOVA).

Table S3. Percentage of milky, translucent, and abnormal secondary embryos during the maintenance phase of secondary embryogenic calluses.

Explant	Treatment	Total Number SSEs	Percentage Milky SSEs (%)	Percentage Translucent SSEs (%)	Percentage Abnormal SSEs (%)
Cotyledon	1 mgL ⁻¹ 2,4,5-T	77	54.5	32.5	13.0
	1 mgL ⁻¹ 2,4,5-T+1mgL ⁻¹ proline	202	67.8	21.8	10.4
	1 mgL ⁻¹ 2,4,5-T+2mgL ⁻¹ proline	117	60.7	27.4	15.4
Hypocotyl	1 mgL ⁻¹ 2,4,5-T	18	44.4	38.9	16.67
	1 mgL ⁻¹ 2,4,5-T+1mgL ⁻¹ proline	31	51.6	29.0	19.35
	1 mgL ⁻¹ 2,4,5-T+2mgL ⁻¹ proline	24	50.0	29.2	20.83