Expansion of a Direct Shoot Organogenesis System in Peanut to include U.S. Varieties.

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The most successful method for producing transgenic peanut is particle bombardment of somatic embryos. One of the major disadvantages of this approach is the time required to produce mature plants (8-12 months). An alternative to lengthy bombardment and regeneration protocols is Agrobacterium-mediated transformation employing direct shoot organogenesis. This strategy allows for mature, transgenic plants to be obtained quickly (3 - 4 months). Peanut cultivars, ‘Florida-07’ (Runner), ‘Georgia Green’ (Runner), ‘Georgia Brown’ (Spanish), ‘New Mexico-A’ (Valencia), and ‘VC2’ (Virginia), were selected to represent all four market types. Two types of cotyledonary explants were examined, those that previously had an attached embryo-axis upon cotyledon separation (explant A) and those that were embryo-axis-free upon separation (explant B). Explants were placed on shoot induction medium (MS salts, B5 vitamins, 3% sucrose, 0.8% agar, 10 µM 2,4-D, pH 5.8) with N6-benzyladenine (BA) concentrations ranging from 10 µM - 80 µM for Florida-07, Georgia Green, and VC2, 10 µM - 320 µM for Georgia Brown, and 10 µM - 640 µM for New Mexico-A. Following a four-week culture period, explants were visually rated based on a scale of 1 to 4, where 1 = slight greening, no growth; 2 = greening, callus-like growth, no adventitious bud formation; 3 = greening, adventitious bud formation; and 4 = greening, adventitious bud formation, small plantlet development. A difference in shoot induction was observed for the cotyledon explants examined (Pr > [t] = <0.0001). Explant A had greater shoot induction with a visual rating of 1.75, while explant B had a rating of 1.64 (Pr > [t] = <0.0001). Additionally, cultivars responded to the culture conditions differently (cultivar * BA interaction). Georgia Green on 40 µM BA producing the most shoot buds (31.2%) and the highest visual rating (2.22), followed by VC2 on 10 µM BA (17.3%, 1.84), New Mexico-A on 640 µM BA (15.9%, 1.84), Georgia Brown on 80 µM BA (9.1%, 1.73), and Florida-07 on 40 µM BA (5.6%, 1.82). Of the tested varieties, Georgia Green, New Mexico-A and VC2 appear to be the best suited for future transformation experiments based on their shoot bud production.