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Abstract:	Keeping in view the importance of W.somnifera (L.) Dunal, commonly known as ashwagandha, present work was carried out to refine the protocol for fast and efficient multiplication through tissue culture, synthetic seed production, detection of antioxidant potential and karyotyping. In micropropagation surface sterilization, bud breaking, callusing, shoot multiplication, root formation and hardening of tissue cultured plants were studied. For surface sterilization, Mercuric chloride (0.05-0.20%) was used. The best survival percentages during surface sterilization of explants were achieved by treating shoot tips with 0.10% of HgCl2 for 10 minutes and leaves with 0.10% HgCl2 for 8 minutes. Bud breaking percentage was higher in MS media supplemented with BAP 1.0 mg/l and AdSO4 25.0 mg/l in comparison to BAP alone. In the present study maximum mean number of shootlets / explant (14± 0.58) obtained in the media supplemented in BAP 1.0 mg/l and AdSO4 25.0 mg/l, which is higher than the media containing 1.0 mg/l BAP and NAA, in which mean number of shootlet/explant was 9.0±0.88 after 45 days. The most effective media for callus induction had lower concentration of auxin NAA (0.25 mg/l) in combination with low concentration of cytokinin 0.5 mg/l BAP. Rhizogenesis were observed when the calli were transferred to MS media containing 0.25 mg/l Kn and 2.00 mg/l 2,4-D. Maximum number of direct shoot regeneration / leaf was 9.0 ± 0.33 obtained in a medium containing 10.0 mg/l BAP +50.0 mg/l AdSO4 + Citric acid 1.0 mg/l. For rooting, 0.5 x MS media supplemented with 5.0 mg/l IBA was found effective. Maximum number of roots i.e., 11.3± 0.33 was found in 5.00 mg/l IBA. When the plants were transferred to green house primary hardening was achieved within 10 days and about 99% plants survived. Artficial seed was prepared by encapsulating axillary shoot bud (Single node) with 1.0 % (w/v) sodium alginate and different concentrations of CaCl2 .2H2O (30,50 and 70 mM).The best morphogenetic response of the microshoots was obtained when encapsulated seeds were placed in MS media enriched with BAP (1.0mg/L) + (25.0mg/L) AdSO4 and maximum germination was about (74.33%) in 30mM CaCl2 after 15 days . Screening of antioxidant activity of the crude methanolic extracts of leaf of tissue cultured and non tissue cultured plants and in vitro grown roots of Withania somnifera was done by using DPPH (1, 1-diphenyl-2-picrylhydrazyl) and ABTS (2,2'-azinobis-(3- ethylbenzthiazoline-6-sulphonic acid) free radical scavenging method and DNA damage protecting activity was checked by inducing hydroxyl radicals on pUC18 plasmid DNA. Extract of Withania leaves(tissue cultured and non tissue cultured) and root were found to have antioxidant potential and efficacy to prevent DNA damage caused by hydroxyl radical. However, root extract was found to have higher antioxidant potential than leaf extract. Karyotype study of tissue cultured and non tissue cultured plants showed no significant difference. Chromosomes were typified on the basis of length and position of centromere.
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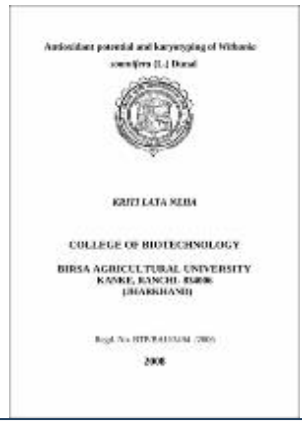

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