Quantification of the mass production of *Zingiber officinale* plants through *in-vitro* shoot tip culture

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In-vitro propagation of *Zingiber officinale* (ginger) through shoot tip culture allows much faster and an efficient tool to produce a large number of true-to-type plants of high quality. The protocols were developed for *in–vitro* initiation, proliferation, subculturing, regeneration and acclimatization in previous studies. Therefore the technology for the mass production of ginger plants is now available.

In the present study mass production of shoots at subculturing was quantified. Quantification of *in-vitro* shoot production would enable to design a production plan for commercialization of the technology.

The number of shoots produced during each subculturing was recorded every four weeks and quantification was done using the data collected during subculturing stages. The rate of shoot multiplication was calculated using the growth rate equation. A comparison between the mean number of shoots at initiation and subculture one to four was made using Tukey's HSD Test at $p=0.05$.

There was a gradual increase in the number of shoots at each subculture, but this was not significant up to the second subculture. However there was a significant increase in the third and fourth subculture suggesting a continuous increase thereafter in shoot number with increased subculture level. The rate of multiplication at second subculture level was 9 shoots/ week while that of fourth subculture level was 12 shoots/ week. The results showed high *in-vitro* shoot multiplication in ginger and therefore possibly economical.

The results of this study revealed that *in-vitro* shoot tip culture is an efficient method for the mass production of ginger. Therefore it could be used to produce a large number of uniform planting materials for commercial cultivation. However the percentage of success during the hardening stage should be undertaken.

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