
Influence of light on growth and production of steroids and glycoalkaloids in *Solanum* species *in vivo* and *in vitro*

S. C. JAIN, S.L. SAHOO AND R. VIJAYVERGIA
Dept. of Botany, University of Rajasthan, Jaipur - 302004,

The effect of light of different spectral region (blue green, yellow and red) was studied on the growth and production of steroids and glycoalkaloids *in vivo* and *in vitro* of *Solanum jasminoides* and *in vitro* only in the *S. verbascifolium*, grown on RT medium. Higher growth as also the maximum growth index of callus was observed in *S. jasminoides* (7.82; control 6.51) and *S. verbascifolium* (6.75; control 6.21) grown under the light of blue spectral region accompanied with the enhanced levels of various metabolites in both plant species.

LIGHT in its intensity, spectral quality and length of daily exposure period, in addition to its effect on plant growth and development in *in vivo* and *in vitro*, also influences the production of plant metabolites. In literature there is, however, no mention of such a work on *S. jasminoides* and *S. verbascifolium*. Therefore, the effect of normal light and of different spectral composition (blue, green, yellow and red) has been studied in the aerial parts and callus cultures of *S. jasminoides* and callus cultures only of *S. verbascifolium* on the yield of steroids and glycoalkaloids.

EXPERIMENTAL

Plants of *S. jasminoides*, as identified by the Herbarium, Department of Botany, University of Rajasthan, Jaipur, were grown in pots under normal cool fluorescent condition. The effect of light of different spectral region (blue 422-492 nm, green 492-535 nm, yellow 535-586 nm, red 647-760 nm) was studied by placing the potted plants in different chambers having the light of normal and specific spectral region. The test samples were drawn after a period of 6 weeks, dried and weighed.

Tissue culture: Callus tissues of *S. jasminoides* and *S. verbascifolium* established on RT medium¹ for 14 months and 10 months respectively under room, light conditions (300 lux) were transferred onto fresh RT medium. Such cultures were allowed to grow for a period of their maximum growth (6 weeks), harvested, dried and growth indices calculated (Final dry weight of tissue/Initial dry weight of tissue).² Five replicates under each experimental light conditions were examined and average growth indices calculated.

Extraction and estimation: Aerial parts, as also various callus tissue samples were powdered and extracted for steroids³ and glycoalkaloids⁴ and identified (on the basis of tlc, mp, mmp, methods, diosgenin⁵, β -sitosterol⁶ and solasodine⁷ were quantified in five replicates in all the test samples and average values were reported.

RESULTS AND DISCUSSION

In the present study, in aerial parts of *S. jasminoides*, better growth in terms of increased height of the plant, flower initiation and other morphological changes was induced in the presence of light of blue spectral region. However, the callus

Table 1: Growth & Yield (mg.gdw) of Diosgenin, β - Sitosterol and Solasodine in Aweila parts and callus cultures of Solanum Jasminoides and S. Verbascifolium.

Light conditions used	S. jasminoides							S. verbascifolium			
	Aerial parts			GI**	Static culture			GI	Diosg-enin	β -sito-sterol	Sola-sodine
	Diosg-enin	β -sito-sterol	Sola-sodine		Diosg-enin	β -sito-sterol	Sola-sodine				
Control	0.342	0.183	2.560	6.51	0.176	0.176	1.850	6.21	0.167	0.252	0.059
Blue	0.547	0.268	3.760	7.82	1.109	0.325	2.360	6.75	0.234	0.296	0.075
Green	0.176	0.345	1.960	6.92	0.987	0.431	2.010	6.05	0.275	0.245	0.067
Yellow	0.345	0.205	3.150	7.25	0.915	0.268	2.120	6.43	0.134	0.190	0.053
Red	0.508	0.367	2.250	7.06	1.246	0.232	1.450	6.00	0.125	0.198	0.061

*mg/g dry weight

** Growth index = (Final dry weight of tissue - initial dry weight of tissue/initial dry weight of tissue)

growth was not affected significantly except in the light of blue spectral region in both the plant species. Interestingly, the synthesis of steroids was stimulated in both, aerial parts and callus of **S. jasminoides** in the light of blue and red spectral regions respectively (**Table 1**). Likewise, diosgenin synthesis was also stimulated in the blue spectral region in the callus tissue of **S. jasminoides** with higher yield of solasodine over the control. Such an effect was also observed in **S. verbascifolium** but, the higher yield of diosgenin and solasodine was in the light of green spectral region than blue. Thus, the light quality and intensity plays an important role in the regulation of secondary metabolites.

ACKNOWLEDGEMENTS

The authors are grateful to CCRAS, New Delhi for the financial support.

REFERENCES

1. Khanna, P. and Staba, E.J., **Bot. Gaz.** 1970, 131, 1.
2. Jain, S.C. and Sahoo, S.L., **Chem. Pharm. Bull.** 1981, 29, 1765.
3. Tomita, Y., Uomori, A. and Minato, H., **Phytochemistry** 1970, 9, 111.
4. Bhatnagar, J.K. and Puri, R.K. **Lloydia** 1974, 37, 318.
5. Sanchez, G.L., Medina Acevedo, J.C. and Soto, R.R., **Analyst**, 1972, 92, 973.
6. Das, S.K. and Banerjee, A.B., **Indian J. Exp. Biol.** 1980, 18, 969.
7. Birner, J., **J. Pharm. Sci.** 1969, 58, 258.