SUMMARY

1. Scientific cultivation of six medicinal plant species viz. Datura innaxia, Datura metel, Nicotiana plumbeaginifolia, Boerhaavia repens, Cassia angustifolia and Dioscorea composite was successful and a new alkaloid in B. repens was characterised and was identified as Punarnavine-2.

2. Effects of different chemical fertilizers on growth and alkaloid formation revealed that a complete combination of N, P and K in the ratio of 100:80:20 kgs/ha in D. innaxia, D. metel, N. plumbeaginifolia and in the ratio of 50:40:30 kgs/ha in B. repens were most effective and induced the vegetative growth, dry weight accumulation and alkaloid formation under the agroecological condition of the region where the study was conducted. It was further revealed that optimum ratios of N & P for maximum growth and active principles formation in C. angustifolia and D. composite were 0:100 and 0:150 kgs/ha respectively.

3. Photoperiodic experiments established D. metel as short-day plant while D. innaxia, N. plumbeaginifolia, B. repens, C. angustifolia and D. composite as long-day ones. Different photoperiodic cycles hastened flowering to varying degrees and promotive effects of light on biogenesis of alkaloids/glycosides was established. Long-day treatment embracing 30 photoperiodic cycles proved to be
highly effective and induced maximum growth and formation of active
ingredients. Short-day treatments inhibited growth as well as contents
of active principle.

4. Gibberellin—effect on growth parameters and alkaloid/
glycoside formation was found to be the function of its concentration.
200 µg/ml gibberellin promoted different growth functions to maximum.
The formation of active principle was also maximum in the said
treatment.

5. Analysis of growth behaviour and alkaloid/glycoside formation
during different developmental stages of plants clearly revealed that
maximum rates of extension growth and dry weight accumulation remained
associated with the maximum rate of formation of alkaloid/glycoside
during reproductive stage of development; later the rates declined
excepting D. composite where maximum rate of diosgenin synthesis took
place during vegetative stage and highest accumulation of diosgenin
occurred till the senescence stage of development.

6. Correlation between an extended duration of reproductive
stage vis-a-vis shortened duration of senescence stage with higher
contents of active principles in all the plants under study had
also been well established.

7. Studies revealed that though the vegetative stage exhibited
maximum rate of growth, the yield of active principles per unit
laminar tissue registered maximum prevalence during reproductive
stage (except in D. composite the same occurring in vegetative stage).
8. Of the different biochemical fractions, soluble nitrogen increased up to reproductive and total nitrogen up to vegetative stage of development. A close agreement between the contents of soluble/protein nitrogen and alkaloid was revealed in alkaloid yielding plants viz. D.innaxia, D.metal, M.plumbaginifolia and B.repens. All the effective treatments of fertilizers, photo-periods and gibberellin established correspondingly a higher occurrence, per unit laminar tissue, of total, soluble, protein nitrogen and active principle contents.