Ascorbic acid has been shown to have a phytohormone like effect in the metabolism of plants and hence termed as photophytohormone (Khudairi, 1968). This vitamin was reported to derepress DNA and stimulate protein and enzyme synthesis (Price, 1966; Schopffer, 1967 and Fallenberg, 1969). Chinoy et al. (1969b), basing on their extensive research work concluded that ascorbic acid has profound effect on the various biological processes, growth, development, flowering and yield in many plants. But no work was found regarding the effect of ascorbic acid on the medicinally active secondary metabolites of plants. Hence we thought it worthwhile to study the effect of vitamin 'C' on the active constituents of Anethum sowa, Trigonella foenum-graecum, Adhatoda vasica and Datura innoxia.

Two varieties of Anethum sowa the pale variyali sowa and dark variyali sowa reported by Shah et al. (1975) were grown and treated with 10, 25 and 50 ppm. concentrations of ascorbic acid supplied as a foliar spray at regular intervals.

The plants were analysed for the volatile oil components at different growth stages by employing chromatographic and spectroscopic methods.

We found that dillapiole was present mainly in the roots and herb oil of dark sowa and only in the root oil of pale sowa before the plants flowered. During flowering, dillapiole was seen in the roots and herb of both pale and dark variety.
plants. Carvone/dihydrocarvone were observed only after fertilization of the flowers. At no stage carvone was seen in the herb oil. According to Malaviya and Dutt (1940) herb oil of \textit{Anethum graveolens} contains mainly phellandrene (75\%). We noticed highest amounts of limonene, but not phellandrene in the herb oils.

There was a gradual accumulation of carvone from young fruits to mature fruits. Major portions of carvone/dihydrocarvone are synthesized by the time when fruits reached to mature green stage. We noticed an inverse correlation between limonene and carvone. \(\alpha\)-terpineol also exhibited similar relation with carvone. Mature green fruits yielded the optimal amount of volatile oil with very high carvone and low dillapiole contents. There was a drastic rise in dillapiole content during the later stage of fruit maturation i.e. in mature grey fruits. At this stage no significant rise was observed in carvone content over the previous stage. The yields of the oil and carvone in mature green fruits and mature grey fruits were nearly equal. But dillapiole content in mature grey fruits is far too higher than that in mature green fruits. Hence, by harvesting the fruits at mature green stage, a high quality of oil with low dillapiole content can be achieved. Shah et al. (1971 b) suggested that Indian dill can be used as a substitute for European dill eventhough the former contains dillapiole which is considered toxic. Then oil from mature green fruits should be more harmless than the oil
obtained from mature grey fruits. Moreover, harvesting the crop at mature green fruit stage helps preventing the shattering of fruits.

Treatment of dark and pale variyali sowa plants with ascorbic acid did not bring about any improvement in the growth and yield of the plants. But the percentage oil content in herbs as well as fruits increased to a considerable extent. In the herb oil more amount of monoterpenoids minor components was observed. Treatment with 50 ppm. concentration of ascorbic acid exhibited some spectacular changes in the formation and accumulation of carvone and dillapiol in the developing fruits of dark variyali sowa. Ascorbic acid at this concentration stimulated a rapid formation of carvone/dihydrocarvone in the fruits where even very young fruits possessed the optimal concentrations of carvone/dihydrocarvone and very little dillapiol.

Final yield data of dark and pale variyali sowa in ascorbic acid treated plants did not vary much from that of control plants. Percentage oil yield was more from ascorbic acid treated fruits than from control ones. We obtained 25-40% more yield of oil by ascorbic acid treatment.

The oil obtained from 50 ppm. treated cremocarps had high carvone and low dillapiol contents compared to fruits from control and other treated fruits. There is 33% rise in carvone and 45% reduction in dillapiol contents of 50 ppm.
treated fruits.

Thus ascorbic acid treatment favoured higher and rapid synthesis of carvone/dihydrocarvone, for which the fruits are valued and reduced the formation of the undesirable and toxic principle dillapiols. Our studies suggest that by treating with ascorbic acid and harvesting the fruits at mature green stage, it is possible to get the best quality oil from Indian dill

Ascorbic acid effect on the diosgenin production of *Trigonella foenum-graecum* was studied at different stages. Fenugreek seeds were pretreated with 10, 25 and 50 ppm concentrations of ascorbic acid and sown in experimental plots. Diosgenin content was estimated at 24, 48 and 72 hours of germination from pretreated seeds, 8 day old seedling, leaves from one month old plants, two month old plants and seeds from final harvest.

Dry seeds of fenugreek had 0.44% of diosgenin while those germinated in simple distilled water contained 0.75% which continued to rise till 72 hours. It is likely that imbibition of water in the germinating seeds might have promoted the conversion of some of the diosgenin precursors like squalene into diosgenin as Herdman and Brain (1971 b) noticed ready incorporation of labeled squalene by plant material incubated in water.
Ascorbic acid stimulated the synthesis of diosgenin. Fenugreek seeds germinated in 50 ppm. ascorbic acid showed 100% increase of diosgenin in 24 hour old seedlings over the dry seeds.

Ascorbic acid pretreated seeds when analysed before sowing revealed that seeds treated with 10 ppm. and 25 ppm. ascorbic acid respectively contained 56.25% and 123.2% more diosgenin than the dry seeds.

Cotyledonary leaves and hypocotyls were separated from 8 day old control and ascorbic acid treated seedlings for the determination of diosgenin. We observed that the cotyledonary leaves are very rich in diosgenin which was found to be 1.5% in control seedlings. Ascorbic acid treatment increased the length and dry weight of the seedlings. Cotyledonary leaves of control plants had relatively high diosgenin content than the treated ones, whereas the reverse trend was found in the diosgenin content of hypocotyl. It seems that in ascorbic acid treated seedlings, a rapid translocation of diosgenin from cotyledonary leaves to the hypocotyl is taking place to meet the demand from actively elongating and dividing cells in that region.

Maximum concentration of diosgenin was obtained from treated leaves of one month old plants and it declined in the later stages, but in control plants leaves attained optimal levels of diosgenin after two months.
Treatment with ascorbic acid did not improve the seed yield in fenugreek. But seeds from treated plants possessed higher concentrations of diosgenin than those of control plants. There is 36% increase of diosgenin in 10 ppm ascorbic acid treated seeds. Thus ascorbic acid treatment proved to be beneficial for diosgenin production in fenugreek plants.

*Adhatoda vasica* is another plant selected to see the effect of 10 ppm ascorbic acid treatment on the total quinazoline alkaloid content in leaves and roots.

We came across two distinct varieties of vasaka, one with big leaves and the other with small leaves. Leaf size and height of the plant in big variety are nearly double to those of small leaf variety. Both the varieties had equal number of chromosomes (2n = 34). But DNA content per cell in the young meristematic cells of root tips is one and a half times more in big variety than in the small one. Polyarc stele was present in the primary root structure of the big variety whereas stele in small leaf variety is of tetrarc type. Inflorescence in both the varieties has marked differences, loose inflorescence with big bracts is characteristic of big variety and inflorescence with small and densely arranged bracts is the main feature in small leaf variety.

Regarding seasonal variation of the alkaloids, there is a gradual increase of the alkaloid from September to
January. During this period small vasaka plants had 1.17% and 1.785% of total alkaloids in leaves and roots respectively. In big vasake alkaloids reached the peak levels twice in the year; first in September and then in January. The roots and leaves of these plants had comparatively high alkaloid contents than the leaves and roots of small variety.

Ascorbic acid in 10 ppm. concentration increased the alkaloid levels of both big and small variety plants. Young roots of small vasaka showed a 100% rise of alkaloid concentration. Ascorbic acid, in general, stimulated alkaloid synthesis at a time when plants produce maximum alkaloids i.e. in September-October and in January-February.

Datura innoxia plants were raised from seeds during summer and winter seasons to see the effect of vitamin 'C' on the tropane alkaloids of various parts.

Plants grown during summer months had always high alkaloid content than those grown in winter. However, the percentage of hyoscyamine and scopolamine in these alkaloids was very poor. Roots contain the highest quantities of alkaloid whereas leaves never showed more than 0.168% total alkaloids. In general, stem is a richer source of alkaloids than leaves in Datura innoxia. Maximum yield of alkaloids was achieved during full bloom period in summer crop and just at the initiation of flower buds in winter crop. Hyoscyamine was found to be higher than scopolamine in all the plant parts.
Ascorbic acid, given in a 10 ppm concentration reduced the alkaloid content in roots, stem, leaves and fruits in both the seasons studied. However, relative contents of hyoscyamine and scopolamine in the total alkaloids was high in the treated plants than in control ones. The present study revealed that Datura innoxia contains more hyoscyamine than scopolamine and that ascorbic acid treatment did not enhance alkaloid yield from the plant.

Thus our results suggest that ascorbic acid has got some effect on the secondary metabolites of the medicinal plants studied. The active principles increased by treatment with ascorbic acid in Anethum sowa containing monoterpenes, in Trigonella foenum-graecum containing diosgenin and other steroids and in Adhatoda vasica having quinazoline alkaloids vasicine and vasicinone. In Datura innoxia, treatment with ascorbic acid decreased the alkaloid concentrations in the different parts of the plant.