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Steroidal Sapogenins XXXVII. Association of Sapogenins and Unsaturated Sterols in *Agave*, *Dioscorea*, and *Yucca*

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In the course of screening a large number of plant materials for steroidal sapogenins, qualitative tests were also made for nonsteroidal groups of constituents—flavonoids, alkaloids, tannins, and unsaturated sterols. The data for the first three 1000-plant accessions have been published (1–6).

It is of practical interest to know whether there are any relations among the above groups of constituents in their occurrence in plants. The steroidal sapogenins are of frequent occurrence in *Agave*, *Yucca*, and *Dioscorea*, but of infrequent occurrence in other groups of plants. Unsaturated sterols are of frequent occurrence in almost all groups of plants, but they are comparatively infrequent in these genera. The present study concerns the relation of steroidal sapogenins to sterols in the accessions in these three genera.

The collections were from many areas. Sometimes there were a number of collections of one plant species, sometimes only one. Sometimes the plants were identified as to genus but not as to species. Because of this irregularity, they were treated merely as a number of individual collections. Data are not sufficient to examine differences between and within species. Sapogenins were recorded by percentage content; sterols, merely as 0, +, ++, or +++.

Preliminary plotting suggested a negative association between sterol and sapogenin content. One tended to be high when the other was low, especially in *Agave* and *Dioscorea*. The following is a statistical treatment of the data.

After a study of possible comparisons, the data were treated statistically by two methods. First, the collections were divided merely into negative (zero) and positive (measurable) genin content for the sterol class 0 and the sterol class +, ++, and +++. The results are in Table I, with the positive genin contents given in per cent of the whole. The frequencies were studied by chi-square tests. Second, the positive collections were compared as to mean and standard error of the genin contents in the sterol classes. The results for *Agave* are in Table II.

With *Agave* (Table I) there is a significant preponderance of genins in the class of 0 sterols as compared with the class of +, ++, and +++ sterols. In the second method (Table II) the second class (+) differs significantly from the first (0) but not from the third (++ and +++).

With *Dioscorea* (Table I) there is a highly significant excess of positive genin

TABLE I

Frequency of Positive and Negative Sapogenin Records in the Sterol Classes

Sterol classes	Number of collections	Genins (% positive)
Agave		
0	183	40
+, ++, +++	242	30
Dioscorea		
0	121	21
+, ++, +++	82	5
Yucca		
0	49	55
+, ++, +++	89	56

TABLE II

Agave, Comparison of Genin and Sterol Content

Sterol reading	No.	Mean genin (%)	Standard deviation	Standard error[a]
0	73	0.46	0.34	0.04
+	60	0.31	0.31	0.04
++, +++	13	0.38	0.35	0.11

[a] Std. dev./$\sqrt{n}$.

collections in the sterol class 0. By the second method, however, the data are inadequate for drawing firm conclusions.

With *Yucca* no significant relations appeared.

Conclusion

Thus with *Agave*, frequencies and average percentages both indicate some negative association of sterols and genins. With *Dioscorea*, the frequencies indicate the same thing definitely; the data are inadequate to compare average percentages. With *Yucca*, no such association is indicated.

Thus with *Agave* and with *Dioscorea*, a strong qualitative test for unsaturated sterols would indicate the likelihood that steroidal sapogenins would be low or absent.

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