

THE COLCHICINE CONTENT AND TOXICITY OF COLCHICUM SEEDS AND CORMS COLLECTED AT DIFFERENT HEIGHTS

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SINCE 1944 systematic studies have been carried out in this Institute (Mascherpa¹), in order to discover the relation between mountain climate and the activity of certain drugs. Marangoni² and Dordi³ have studied valerian, frangula and aconite; similar researches are now being made on *Digitalis lutea*, and on some vitamin-containing fruits. Many authors have already investigated this subject, which is interesting from both the scientific and practical points of view; for references, besides the cited authors, the reviews in Meier's⁴ and Bänninger's⁵ works may be consulted. No research has yet been made, as far as I know, on the relation between the toxicity and colchicine content of colchicum, and mountain climate.

MATERIAL AND TECHNIQUE

The material used were the seeds and corms of *Colchicum autumnale* L., collected in the months of July and August on the Alps (valleys of Aosta and Fiemme), on the Apennines and in the plain (province of Pavia), at the heights of 50, 100, 1000, 1200, 1400 and 2200 metres above sea level. At the heights for which it was possible, the material was collected in different places, in the attempt to exclude other factors than altitude, such as soil, sunlight, winds, rains, eventual fertilisation, etc. Plants growing wild on untilled ground and showing ripe seeds in dried capsules were collected. The seeds and corms, after being dried first at room temperature, then in an oven at 45°C. until of constant weight, were powdered and all stored under the same conditions.

For the chemical determination of colchicine, from the numerous methods suggested the method of Self and Corfield⁶ adopted in the British Pharmacopœia was selected because of its greater quickness and accuracy. For the toxicity tests tinctures were prepared by percolation (10 per cent.) according to the Pharmacopœia Helvetica V (Italian edition). These tests were made, for each sample gathered, on 3 groups of albino mice (average weight 25 g.), which received intraperitoneally doses of 0.0010, 0.0015 and 0.0020 g. of drug per g. of weight. The mortality was observed after 96 hours.

EXPERIMENTAL RESULTS

Chemical assays.—The results of the chemical assays are reported in Table I; the percentages of colchicine are referred to the dry drug.

These results show that the colchicine generally decreases as the altitude increases; this diminution is far more definite in the seeds than in the corms.

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TABLE I
CHEMICAL ASSAYS

Metres above sea level	Average weight of 100 seeds g.	Colchicine in seeds per cent.	Average weight of one corm g.	Colchicine in corms per cent.
50	0.541	0.45	0.646	0.150
100	0.299	0.55	0.750	0.098
1000	0.218	0.35	5.066	0.077
1200	0.341	0.37	1.415	0.125
1400	0.462	0.22	2.042	0.132
2200	0.337	0.24	4.617	0.085

Toxicity Tests.—The results of the toxicity tests for seeds and corms are shown in Table II.

TABLE II
TOXICITY TESTS

Metres above sea level	Mortality per cent. to the doses					
	0.0010 g.		0.0015 g.		0.0020 g.	
	Seeds	Corms	Seeds	Corms	Seeds	Corms
50	80	70	100	60	100	90
100	90	30	90	30	100	70
1000	60	40	60	80	60	30
1200	50	60	60	50	70	100
1400	30	20	50	50	60	60
2200	30	30	40	80	60	50

The results of the determination of colchicine obtained are generally confirmed: in seeds a diminution of toxicity is observed as the altitude increases; in corms a relation between toxicity variations and altitude cannot be detected.

SUMMARY AND CONCLUSIONS

1. The content of colchicine, and toxicity, were studied in relation to altitude in the seeds and corms of *Colchicum autumnale* L., gathered on the Alps, Apennines and the plain, at the heights ranging from 50 metres to 2200 metres above sea level; the results obtained permit only general conclusions to be drawn.

2. In general, as altitude increases, there is a diminution in the colchicine content and the toxicity of seeds; the colchicine content and the toxicity of corms do not seem to be in evident relation to altitude.

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3. With regard to these results, the greater influence of climatic variations on overground than on underground organs, and the fact that the latter, being storage organs, take generally a less active part in the metabolic changes caused by climatic factors on plants may be considered:

4. The advantage of using seeds rather than corms is confirmed. The necessity for a strict chemical and pharmacological control of colchicum to be used for therapeutic purposes is also confirmed. From the chemical point of view, colchicum gathered as far as 1000 metres above sea level is to be preferred.

REFERENCES

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