Producing Specific High Mineral Content Pollen

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The association between mineral composition in pollen and the geological background of soil in three mine regions and three orchards was assayed systematically. The results showed that the geological condition of the soil could affect the mineral content of pollen. An effective way of using pollen to look for minerals through biogeochemistry was expounded. A new idea regarding producing special pollen from different geological backgrounds is presented.

The geologists Warm et al (1982) analyzed the samples of honey bee pollen from different regions. The results showed that the content of copper (Cu) and molybdenum (Mo) in pollens of mine regions are higher than that of non-mine regions by as much as ten times. Accordingly, he thinks we can use the honey bee to collect the pollen, then analyze the mineral content of the honey bee pollen and deduce the distribution of the mineral region. According to the magazine "*Mine Magazine*", a Canadian scientist found the content of copper in the pollens of one of the regions was extraordinarily high, up to 0.084%. Then, he found a copper mine in the region. At the same time, a zinc mine was found in another region because the content of zinc in the pollens was very high. A soviet scientist unexpectedly found the content of copper, molybdenum and titanium were unusual when he analyzed the composition of the honey of a South Uruguayan apiary. After investigation, he found the area full of the mineral resources of copper, molybdenum and titanium. This research studied the nectariferous plants in mine regions and fruit trees, investigating the potential association between mineral composition in the pollens and the geological background of rock, soil, plants and pollen.

Materials and methods

The rock, soil, and leaves of tea tree and its pollen were sampled in Xinyu iron mine region (A), Dexing- huaqiao copper mine region (B), Yinshan lead (Pb) and zinc (Zn) mine region (C) of Jiangxi province in China, respectively. The rock, soil, fruit and pollen were sampled in three big orange groves, Anxi District (D), Changgan District (E) and Xiniu District (F) of Xinfeng county of Jiangxi province in China, respectively.

The mineral content of samples was determined with a Z-8000 atom absorption spectrometer (AAS) and used to determine the content of elements Cu, Zn and Fe by AAS.

Results and discussion

The results in Table 1 show, the mineral content in the pollens of tea tree are different in three mine regions. The content of Fe in the pollens in region A are higher than those in region B and region C, 177.65% and 20.31%, respectively. The content of Cu in region B is higher than those in region A and region C, 16.38% and 14.92%, respectively. The content of lead in region C is higher than those in region A and region B, 74.33% and 95.89%, respectively. These results show that the content of mineral in the pollens can be used to prospect with biogeochemistry.

The differences in the soil geological background can be used to produce special pollen

The results in Table 2 reveal that the content of the elements K, Fe, Ca, Mg, Na, Cu, Mn and Zn in the orange pollens are higher than those in the orange fruits, and some up to tens to several hundred times. The content of one element is different among three orchards because of the differences in the soil's geological background, though the plants are all orange and the climate is similar. For example, the content of element Fe in the orange pollens in region D amounts to 693.42μg/g, but those in region E and region F are 51.59μg/g and 48.50μg/g, respectively. For another example, the content of the

mine region	sample	Fe	Cu	Pb	Zn	Mn	Cd	Co	Ni	Ca
A	pollen	164.98	16.48	0. 82	23.84	685.10	0.07	0.78	0.46	2150
	leaf	229.96	27.50	3.44	33.73	1025	0.03	2.75	0.42	12723
	soil	18044	28.14	41.62	54.00	322.10	0.31	4.57	15.97	487
	rock	35066	30.33	26.63	51.55	341.70	0.10	8.33	13.48	733
B	pollen	137.13	19.18	0.73	58.39	106.20	0.05	1.32	0.26	2500
	leaf	1227.20	20.81	3.50	68.55	479.300	0.12	4.80	0.39	4240
	soil	28099.70	47.82	27.82	10.43	394	0.45	10.86	11.16	654.70
	rock	16923	47	10.68	111.10	235	0.23	6.82	11.59	692
C	pollen	59.42	16.69	1.43	35.02	130.60	0.03	0.67	0.22	1901
	leaf	248.68	26.38	3.12	21.76	1273	0.07	1.97	0.43	5040
	soil	34546.70	55.40	137	96.77	556.50	0.29	5.45	16.07	922.30
	rock	18701	39.25	35.68	71.37	164.20	0.10	10.70	13.33	1142

Table 1. The content of 10 mineral elements in rock, soil, leaves and pollen of different mine regions—μg/g

orange farm	sample	K	Fe	Ca	Mg	Na	Cu	Mn	Zn
D	fruit	1389	1.60	242.40	132.50	2.40	0.42	0.90	0.72
	pollen	3531	693.42	1590	1080	218	9.76	41.01	160.30
	soil	7200	55400	325	1350	170	26. 70	268	48. 05
	rock	21600	48200	2100	3200	1700	25.50	300.60	48.89
E	fruit	1400	2.60	123.80	95.60	3.20	0.28	0.32	0.74
	pollen	3988	51.59	845	216	327	4.11	12.76	47.13
	soil	6550	49900	275	1900	405	38. 45	109. 5	87. 90
	rock	17850	20880	37750	4770	2310	33.26	621.60	39.72
F	fruit	11000	16.80	885	256	66.30	0.60	2.30	2.95
	pollen	3719	48.50	894	841	350	7.42	132.50	32.21
	soil	17200	29800	670	5800	820	25.30	175	78.40
	rock	20600	21600	51400	7040	5820	15.60	810.70	76.44

Table 2. The content of 8 mineral elements in rock, soil, fruit and pollen of different orchard regions—μg/g

element Zn in region D, E and F are 160.28μg/g, 47.13μg/g and 32.21μg/g, respectively. The results suggest that some pollens with high mineral content (the pollens with high content of elements Fe, Zn, Se, etc.) can be produced, according to the differences in the geological background of soil where the nectariferous plants grow. This opens the possibility to produce high mineral foods and medicines from pollen.

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