

BIOGENIC EVAPORITES FROM SECRETION OF POPULUS DIVERSIFOLIA AROUND DESERT AREA, XINJIANG, NW CHINA. S. Yabuki¹, A. Okada¹, Z. Fan², and Q. Chang², ¹The Institute of Physical and Chemical Research, Riken, Japan, ²Xinjiang Institute of Biology, Pedology and Desert Research, Chinese Academy of Sciences, China.

Populus Diversifolia is a predominant vegetation on the floodplain of Tarim River, the largest river in Tarim Basin, Xinjiang, NW China. Halophytic plants in the saline, arid and semi-arid areas sometimes have very peculiar physiological features. *Populus diversifolia* is one of such plants, known as it concentrates carbonate and bicarbonate ions to their stems, leaves and secretion. Therefore, the soil under old *Populus diversifolia* forest commonly shows an obvious characteristic of soda salinization.

The secretion from mechanically damaged portion or cut ends of *Populus diversifolia* solidify to make edible salt that is called poplar salt. As it contains considerable amount of sodium bicarbonate, local people use it for soap production, medicine or for baking powder.

The authors made chemical and mineralogical approach about the poplar salt and found this salt is made of various kinds of alkaline and alkaline earth carbonates and bicarbonates as well as potassium chloride.

Natural occurrences of potassium and magnesium carbonates have been reported very rare. Because of its peculiar biological feature and arid climate, such unusual evaporites seem to be formed.

Chemical Composition: Chemical composition of poplar salt is shown in Table together with referential data. Dominant cations are sodium and potassium, while magnesium content is low and only a small amount of calcium is found. Carbonate and bicarbonate are main anions and considerable amount of chlorine is also found.

Mineralogical Study: X-ray diffraction analysis and elemental analysis by EPMA suggest the existence of following evaporite minerals.

1. Trona, $\text{NaHCO}_3 \cdot \text{Na}_2\text{CO}_3 \cdot 2\text{H}_2\text{O}$

Trona is dominant component of poplar salt. It consists of well developed euhedral crystals. These results suggest that trona crystallized first.

2. Baylissite, $\text{K}_2\text{CO}_3 \cdot \text{MgCO}_3 \cdot 4\text{H}_2\text{O}$

Colorless fine-grained aggregates, usually adjacent to trona and sometimes enclosed by sylvite.

3. Sylvite, KCl

Sylvite crystals fill the space between trona aggregates and sometimes euhedral crystals are observed. Chlorine only distributes together with potassium.

4. $\text{K} : \text{CO}_3 = 2 : 1$ phase

Adjacent to sylvite, we often found potassium carbonate phase. Quantitative analysis by EPMA suggests this phase to be $\text{K}_2\text{CO}_3 \cdot 3/2\text{H}_2\text{O}$ phase, but we have not yet recognized this mineral by X-ray diffraction.

5. $\text{Na} : \text{Ca} : \text{CO}_3 = 1 : 1 : 2$ phase

From the element distribution map and quantitative analysis by EPMA, this phase seems to be $\text{NaHCO}_3 \cdot \text{CaCO}_3$.

6. (Ca, Mg) CO_3 phase

This phase microscopically looks similar to baylissite and calcium carbonate phase. Analytical results show a part of calcium of CaCO_3 is replaced by magnesium.

Salt content of *Populus diversifolia* (meq/kg)

Sample	CO_3^{2-}	HCO_3^-	SO_4^{2-}	Cl^-	Ca^{2+}	Mg^{2+}	$\text{Na}^+ + \text{K}^+$
Leaf	2947	1751		459	-	-	-
Stem		1941	4	273	20	99	2096
Secretion	4883	2897	15	3192	30	1299	10770
Poplar salt	3400	6820	13	2571	11	210	8330 3551