

# **The Correlation between Seabuckthorn Berry Quality and Its Altitudes of Occurrence Areas**

**Lu Rongsen**

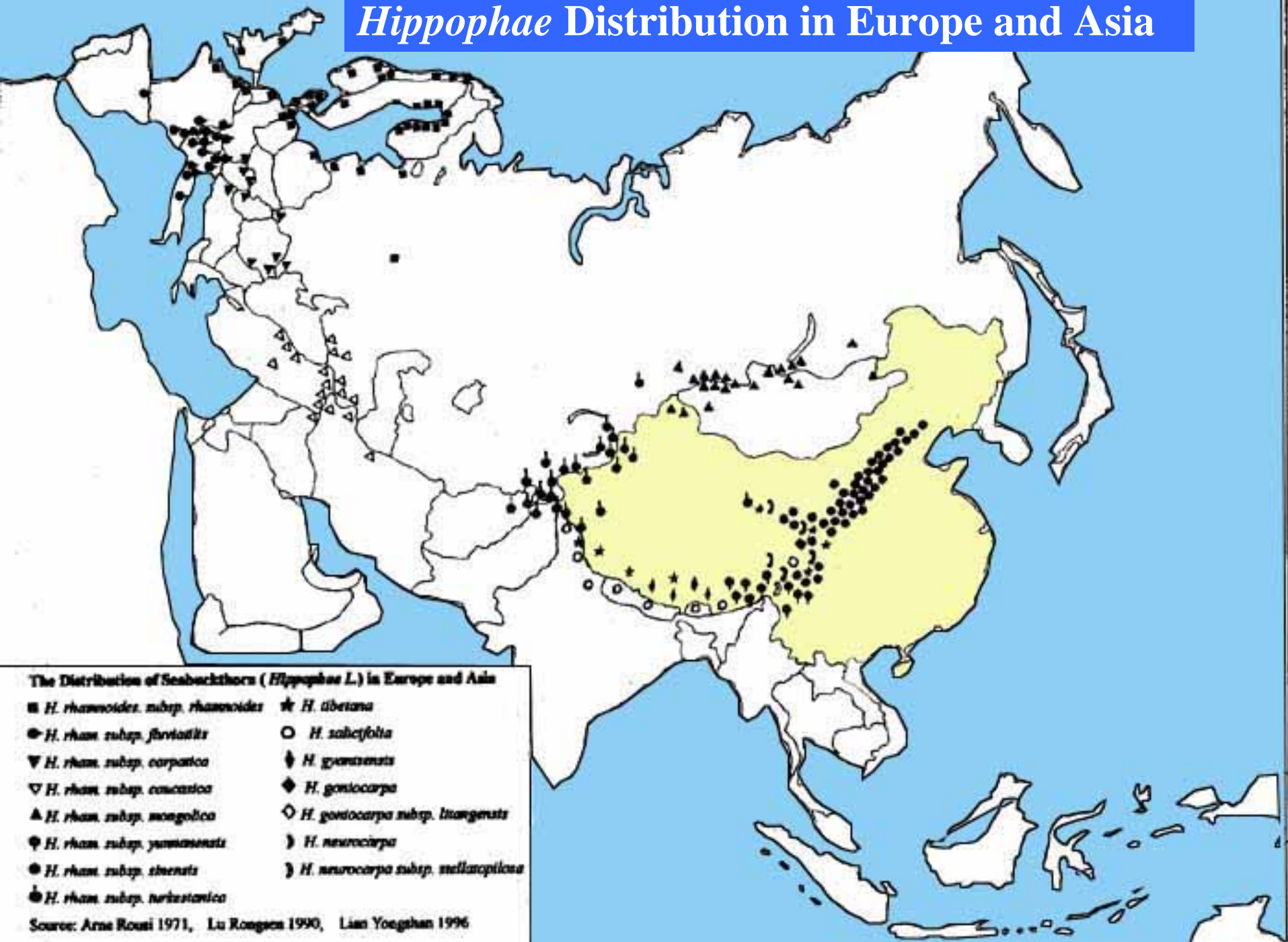
**Chengdu Institute of Biology, Chinese  
Academy of Sciences**

**E-mail:rongsenl@163.net**

# Objective

- 1. Chinese seabuckthorn is most important species of and widely distributed in a large area of north, north-west China. The total area of Chinese seabuckthorn is about 1.33 million hectares including wild and cultivated which account for 90% of total resource in the world.**
- 2. This species is the main resource for seabuckthorn industry in China. It is needed to know which existed places could get better quality of seabuckthorn berries and how to select areas to establish new plantations that could produce the best quality of berries.**
- 3. The study reports a precise experimental results that how altitudes influence the seabuckthorn berry's quality.**

# *Hippophae* Distribution in Europe and Asia



The Distribution of Seabuckthorn (*Hippophae* L.) in Europe and Asia

- |   |  |
|---|--|
| ■ <i>H. rhamnoides</i> subsp. <i>rhamnoides</i> | ★ <i>H. tibetana</i>                               |
| ● <i>H. rham.</i> subsp. <i>fruticosa</i>       | ○ <i>H. salicifolia</i>                            |
| ▼ <i>H. rham.</i> subsp. <i>carpanica</i>       | ◆ <i>H. goniocarpa</i>                             |
| ▽ <i>H. rham.</i> subsp. <i>concastica</i>      | ◇ <i>H. goniocarpa</i> subsp. <i>litangensis</i>   |
| ▲ <i>H. rham.</i> subsp. <i>mongolica</i>       | ⌋ <i>H. neurocarpa</i>                             |
| ⊕ <i>H. rham.</i> subsp. <i>yunnanensis</i>     | ⌋ <i>H. neurocarpa</i> subsp. <i>stellatocarpa</i> |
| ● <i>H. rham.</i> subsp. <i>thunbergii</i>      |  |
| ● <i>H. rham.</i> subsp. <i>turkestanica</i>    |  |

Source: Arne Rousi 1971, Lu Rongsen 1990, Lian Yongshan 1996





**Chinese Seabuckthorn-A big tree near forest**

*H.rham.ssp.sinensis*





# Experimental materials and methodology

- 1. Seabuckthorn growing places comparison: the berry samples were collected from 9 places from the north- east to the south- west of China according to their occurrence in 2005. Each berry sample ( 2 kilos )were collected from 20 individual seabuckthorn trees in one place.**
- 2. Seabuckthorn occurrence altitude comparison: the berry samples were collected from 7 places from 1900 m to 3100 m in the Wolong valley, west Sichuan, China in 2004-2006. Each berry sample ( 2 kilos )were collected from 20 individual seabuckthorn trees in one altitude.**
- 3. The items of chemical analysis included soluble sugar, organic acids, vitamin C, seed oil and pulp oil contents.**
- 4. The soluble sugar was determined by Abe Refract Meter; the organic acids by titration; the vitamin C by 2,6-dichlorindophenol sodium; the seed oil and pulp oil were extracted by petroleum ether;**

# Conclusions and discussion

## • A. Experiment results in different SBT places

- 1. The results of chemical analysis of the berries of Chinese seabuckthorn grown in the places with different altitudes in 2005, The weight per 100 berries, the contents of soluble sugar, seed oil and pulp oil are not increased along with the increase of altitude. But the contents of organic acids and the vitamin C seem increase along with the increase of altitude.
- 2. The correlation analysis between altitudes and berry quality of Chinese seabuckthorn grown in places with different altitudes in 2005. There are direct correlation between the altitudes and the contents of organic acids and vitamin C. The correlation coefficient is 0.734 (P 0.05) and 0.877 (P 0.01) respectively. There is also a high direct correlation between the content of organic acids and content of vitamin C. The correlation coefficient is 0.932 (P 0.01).

**Table 1. Chemical Analysis results of the berries of Chinese seabuckthorn (*H.rhamnoides ssp.sinensis*) grown in places with different altitudes in 2005**

Occurrence places	Altitude (m)	Weight/100 berries (g)	Soluble Sugar (% 0	Organic Acids (%)	Vitamin C (mg/100g)	Seed oil content (%)	Pulp oil content (%)
Harbin, Heilongjiang	150	16.80	10.0	2.36	345.5	6.25	0.62
Suilin, Heilongjiang	300	19.20	11.5	2.96	403.0	6.20	0.93
Fuxin,Liaoning	450	18.77	10.5	3.82	460.5	6.78	1.06
Erdos,Inner Mongolia	1200	16.66	13.0	3.08	479.0	8.87	1.05
Fengning,Hebei	1400	15.08	11.5	2.78	581.0	8.14	1.08
Huanglong, Shaanxi	1500	15.52	11.5	4.07	915.0	6.65	0.87
Jiaokou,Shanxi	1600	19.064	11.0	2.73	593.5	6.27	0.64
Wuqi,Shaaxi	1700	14.38	13.0	5.39	1008.0	7.45	1.01
Qingshui,Gansu	1800	16.15	12.0	5.07	1082.0	8.44	1.65
Maoxian,Sichuan	1900	19.10	10.0	5.57	1163.0	7.46	1.03
Wolong,Sichuan	2400	15.18	11.0	6.28	1243.0	6.84	1.02

**Table 2. Correlation Analysis between altitudes and berry quality of Chinese seabuckthorn (*H.rhamnoides ssp.sinensis*) grown in places with different altitudes in 2005**

	Weight / 100 berries (g)	Soluble Sugar (%)	Organic Acids (%)	Vitamin C (mg/100g)	Seed oil content (%)	Pulp oil content (%)
Altitude (m)	Y 0.400 P 0.222	0.239 0.079	<u>0.734*</u> 0.010	<u>0.877**</u> 0.000	0.367 0.266	0.358 0.280
Weight/ 100 berries (g)		-0.510 0.109	-0.327 0.326	-0.382 0.247	-0.409 0.212	-0.282 0.400
Soluble Sugar (%)			0.074 0.829	0.075 0.826	0.586 0.579	0.376 0.255
Organic Acids (%)				<u>0.932**</u> 0.000	0.189 0.579	0.487 0.129
Vitamin C (mg/100g)					0.226 0.505	0.454 0.161
Seed oil Content (%)						<u>0.705*</u> 0.015
Pulp Oil Content (%)						

**Table 3. Chemical Analysis results of the berries of Chinese seabuckthorn (*H.rhamnoides ssp.sinensis*) grown in Wolong valley, Sichuan, China with different altitudes in 2004-2006**

Altitude (m)	Year of sample collected	Weight / 100 berries (g)		Soluble Sugar (%)		Organic Acids (%)		Vitamin C (mg/100g)	
1900	2004	14.22		7.5		5.55		688.8	
	2005	14.00	14.46	6.0	6.83	4.56	5.10	748.0	755.1
	2006	15.15		7.0		5.19		828.6	
2100	2004	14.92		7.0		4.95		795.0	
	2005	14.98	5.04	7.5	7.33	5.39	5.16	973.0	913.0
	2006	15.23		7.5		5.15		971.0	
2300	2004	15.88		8.0		4.90		1005.0	
	2005	17.21	16.55	7.0	7.83	5.62	5.21	1163.0	1059.3
	2006	16.55		8.5		5.10		1010.0	
2500	2004	15.72		9.0		6.30		1100.0	
	2005	16.04	18.25	10.0	10.00	6.58	6.75	1151.0	1089.2
	2006	17.00		11.0		7.36		1016.7	
2700	2004	15.55		10.5		6.70		1164.5	
	2005	15.23	15.70	11.5	11.00	7.64	7.28	1243.0	1206.0
	2006	16.30		11.0		7.51		1210.5	
2900	2004	15.20		10.0		7.25		1235.0	
	2005	14.09	15.13	10.0	10.17	7.17	7.06	1381.0	1304.7
	2006	16.10		10.5		7.05		1298.0	
3100	2004	15.42		10.5		6.39		1372.5	
	2005	16.50	15.61	9.0	9.83	6.34	6.18	1162.0	1305.6
	2006	14.90		10.0		5.81		1381.0	

**Table 4. Correlation Analysis between altitudes and berry quality of Chinese seabuckthorn (*H.rhamnoides ssp.sinensis*) grown in Wolong valley, Sichuan, China with different altitudes in 2004-2006**

Altitude (m)	Altitude (m)	Weight/ 100 berries (g)	Soluble Sugar (%)	Organic Acids (%)	Vitamin C (mg/100g)
Altitude (m)		R 0.296 P 0.520	<u>0.845*</u> 0.017	0.742 0.056	<u>0.975**</u> 0.000
Weight/ 100 berries (g)			0.366 0.420	0.205 0.659	0.410 0.361
Soluble Sugar (%)				<u>0.962**</u> 0.001	<u>0.861*</u> 0.013
Organic Acids (%)					<u>0.767*</u> 0.044
Vitamin C (mg/100g)					

# Conclusions and discussion

## B. Experiment results in different altitudes

3. The results of chemical analysis of the berries of Chinese seabuckthorn grown in Wolong valley, Sichuan, China with different altitudes in 2004-2006 are shown in table 3. It can be seen that the weight per 100 berries are not increased along with the increase of altitude. But the contents of soluble sugar, organic acids and the vitamin C seem increase along with the increase of altitude.

4. The correlation analysis between altitudes and berry quality of Chinese seabuckthorn grown in Wolong valley, Sichuan, China with different altitudes in 2004-2006. There are direct correlation between the altitudes and the contents of soluble sugar and vitamin C. The correlation coefficient is 0.854 (P 0.05) and 0.975 (P 0.01) respectively. There is a direct correlation between the content of soluble sugar and the content of organic acids. The correlation coefficient is 0.962 (P 0.01). There is a direct correlation between the content of soluble sugar and the content of vitamin C. The correlation coefficient is 0.861 (P 0.05). There is also a direct correlation between the content of organic acids and the content of vitamin C. The correlation coefficient is 0.767 (P 0.05).

# Conclusions and discussion

## C. Conclusion and suggestion

- 5. The results shown that the berry quality ( such as soluble substances, organic acids, vitamin C, seed oil and pulp oil contents etc. ) relies on its altitudes of grown areas. Among those the contents of soluble sugar, organic acids and vitamin C have direct correlation with their altitudes. In 1900-3100 m the higher the altitude, the higher the contents of soluble sugar, organic acids and vitamin C.**
- 6. The results suggest that in the distributed areas of seabuckthorn in China establishing seabuckthorn plantations in higher altitude areas can produce better quality berries.**

SBT plantation and inter cropping- soybean



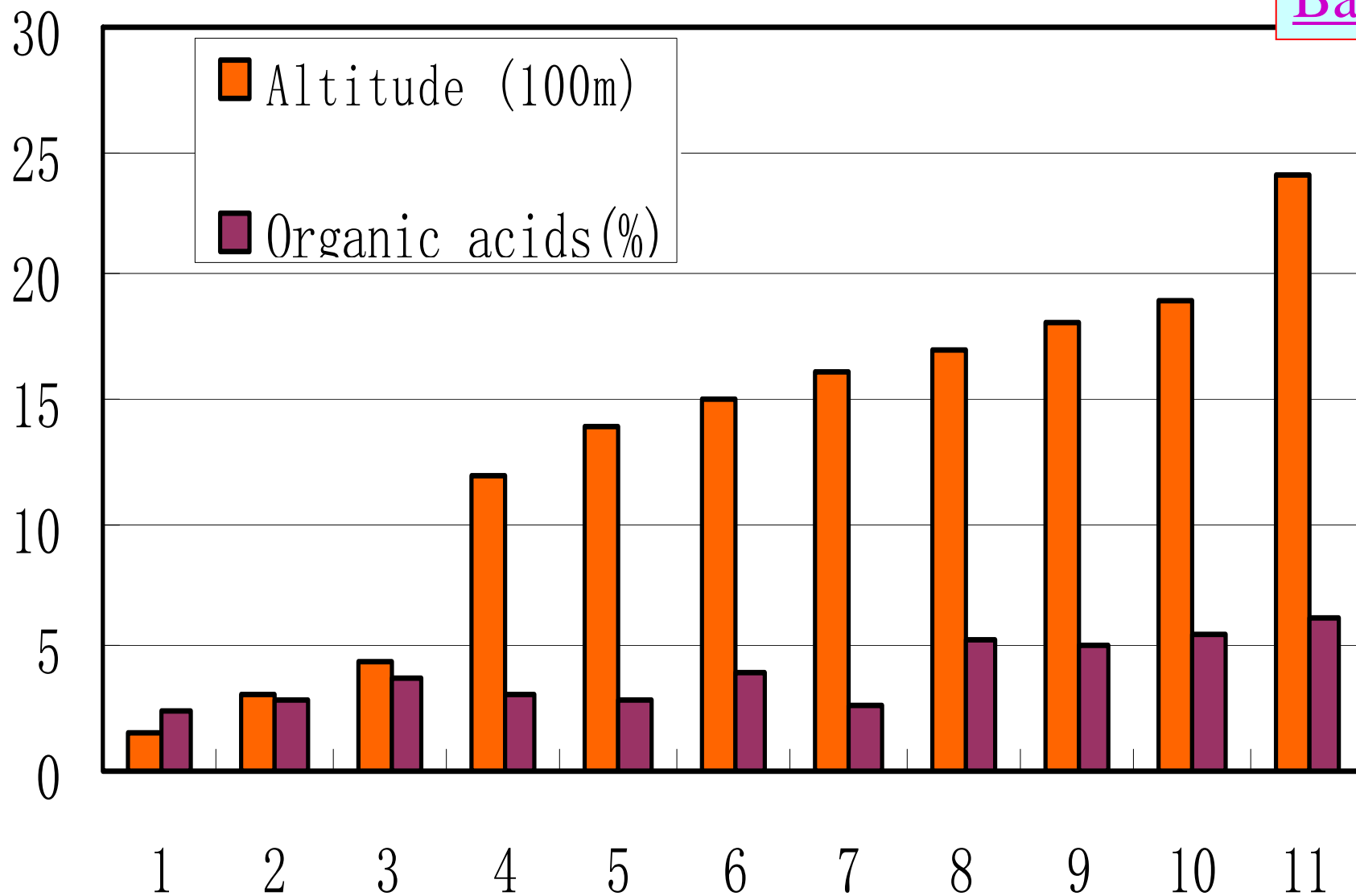
# **Barren Mountain becomes Green Mountain, Seabuckthorn- A Green Hope for Mt.People**



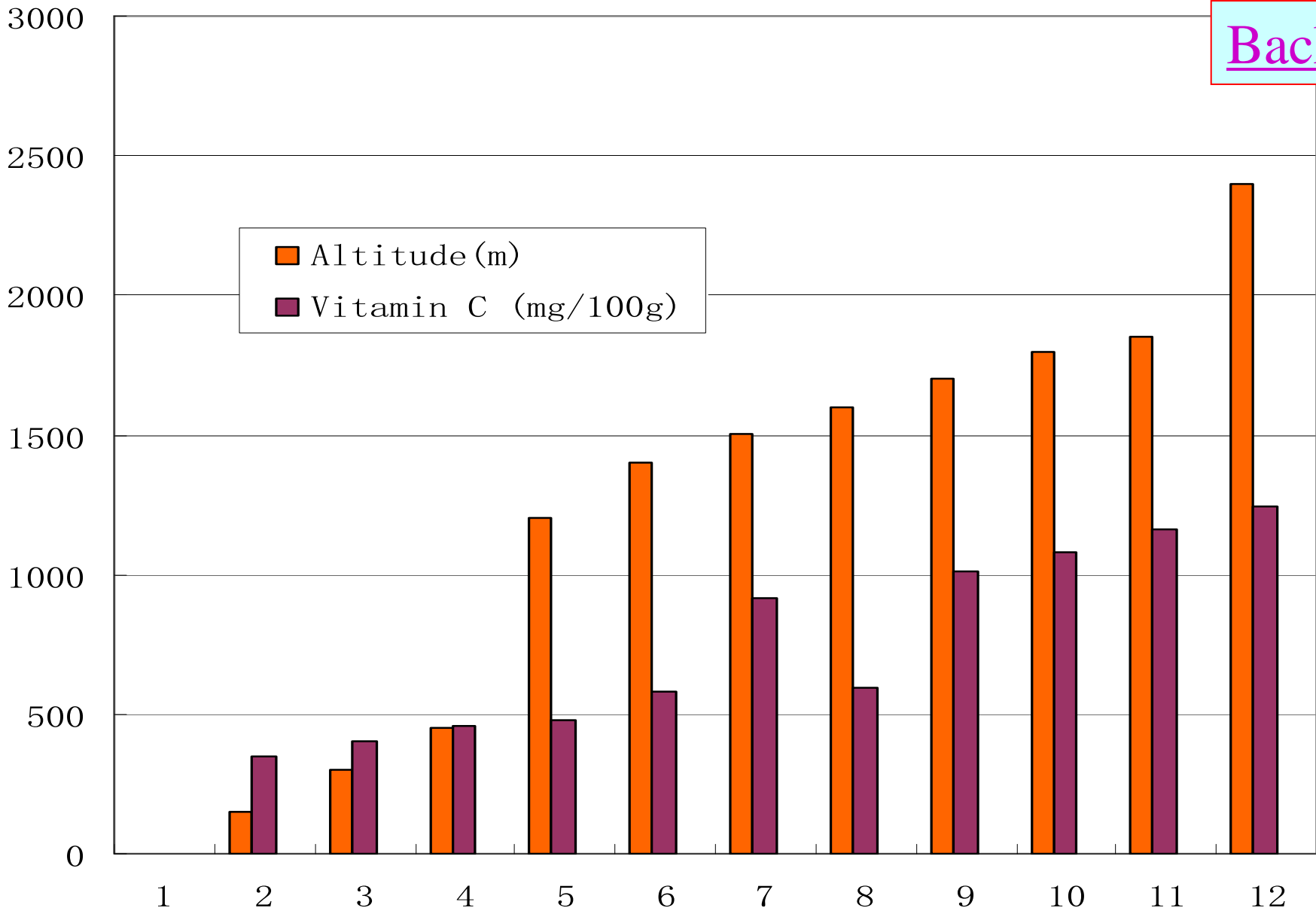
**End**

**Thank You!**

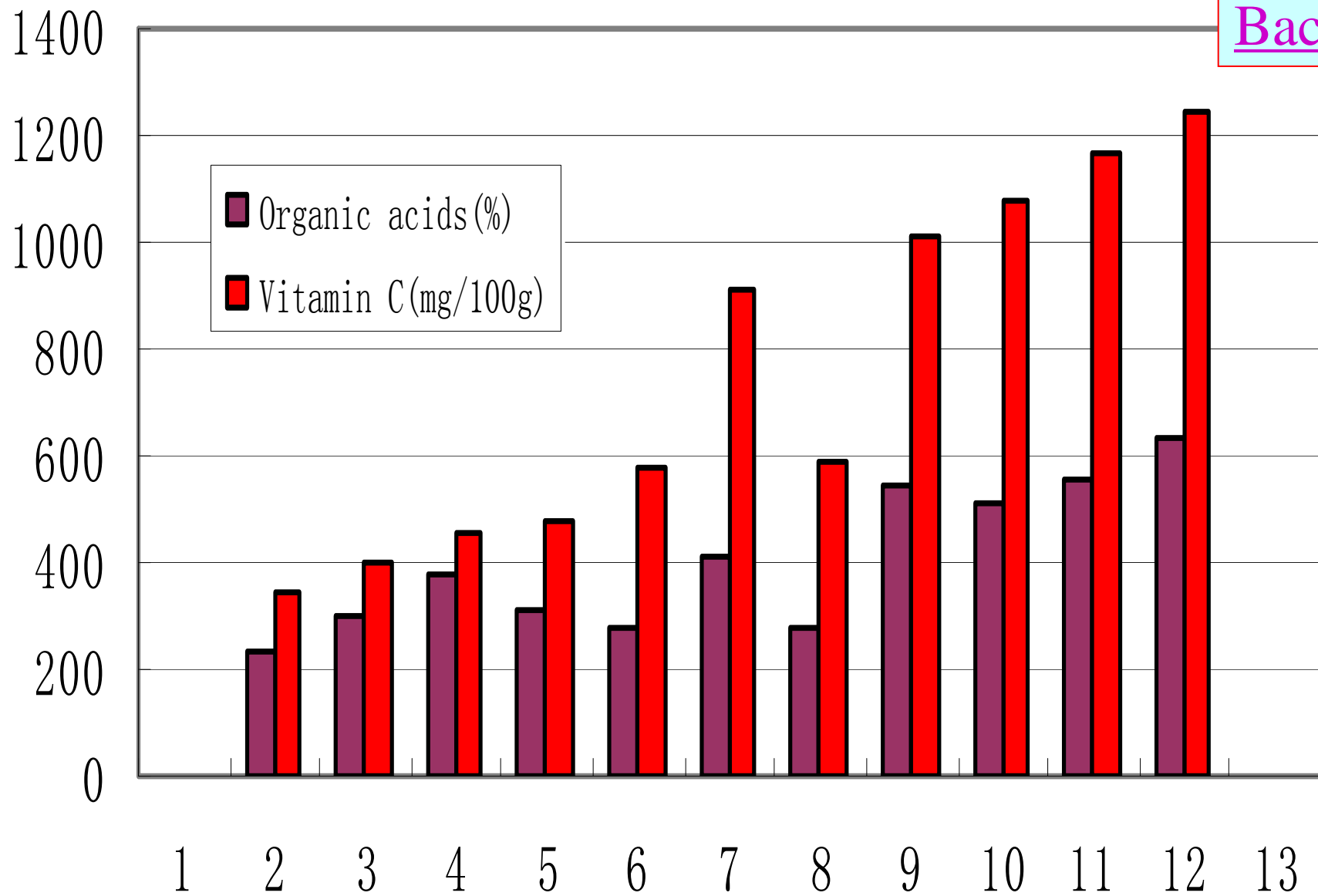
[Back](#)



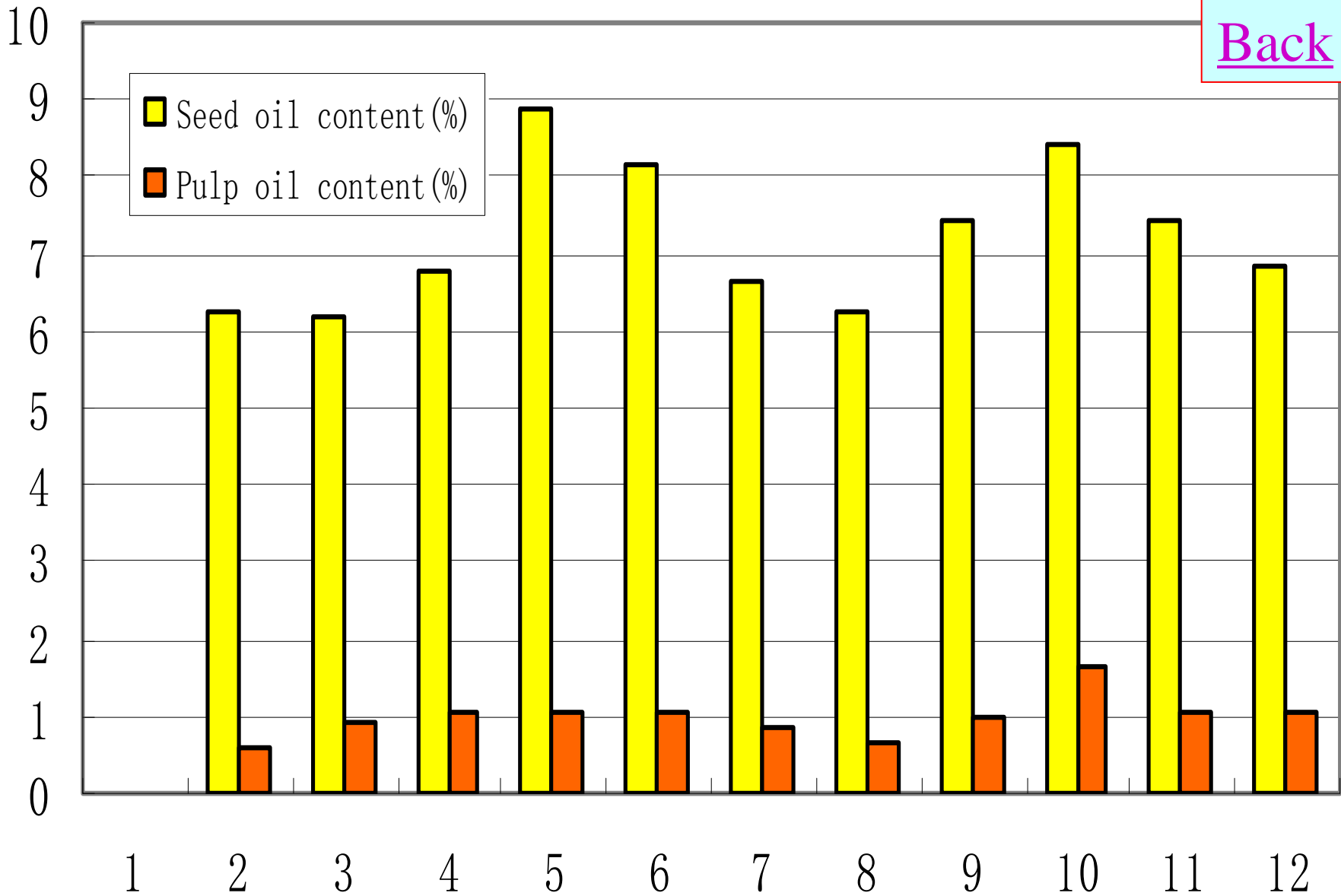
[Back](#)



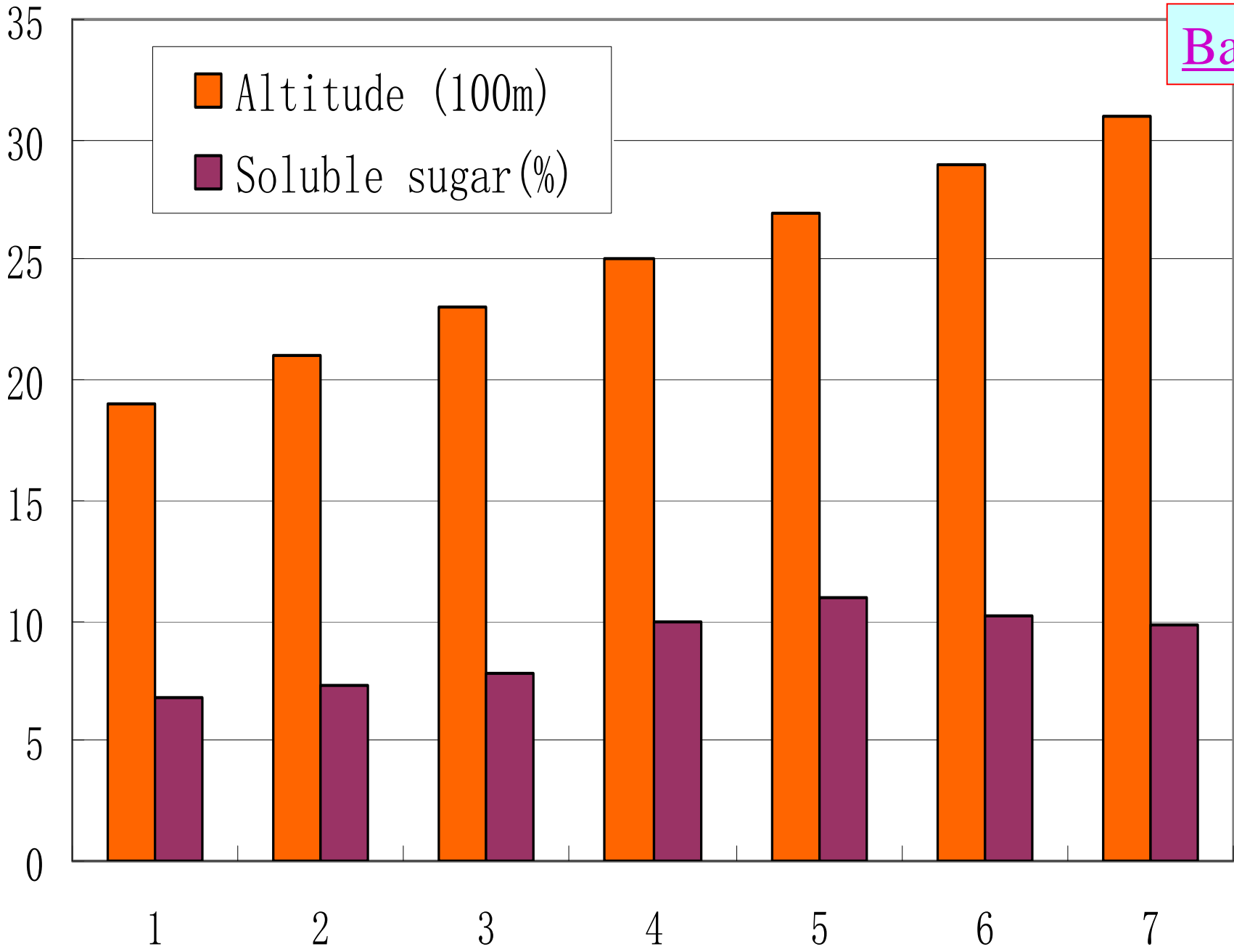
[Back](#)



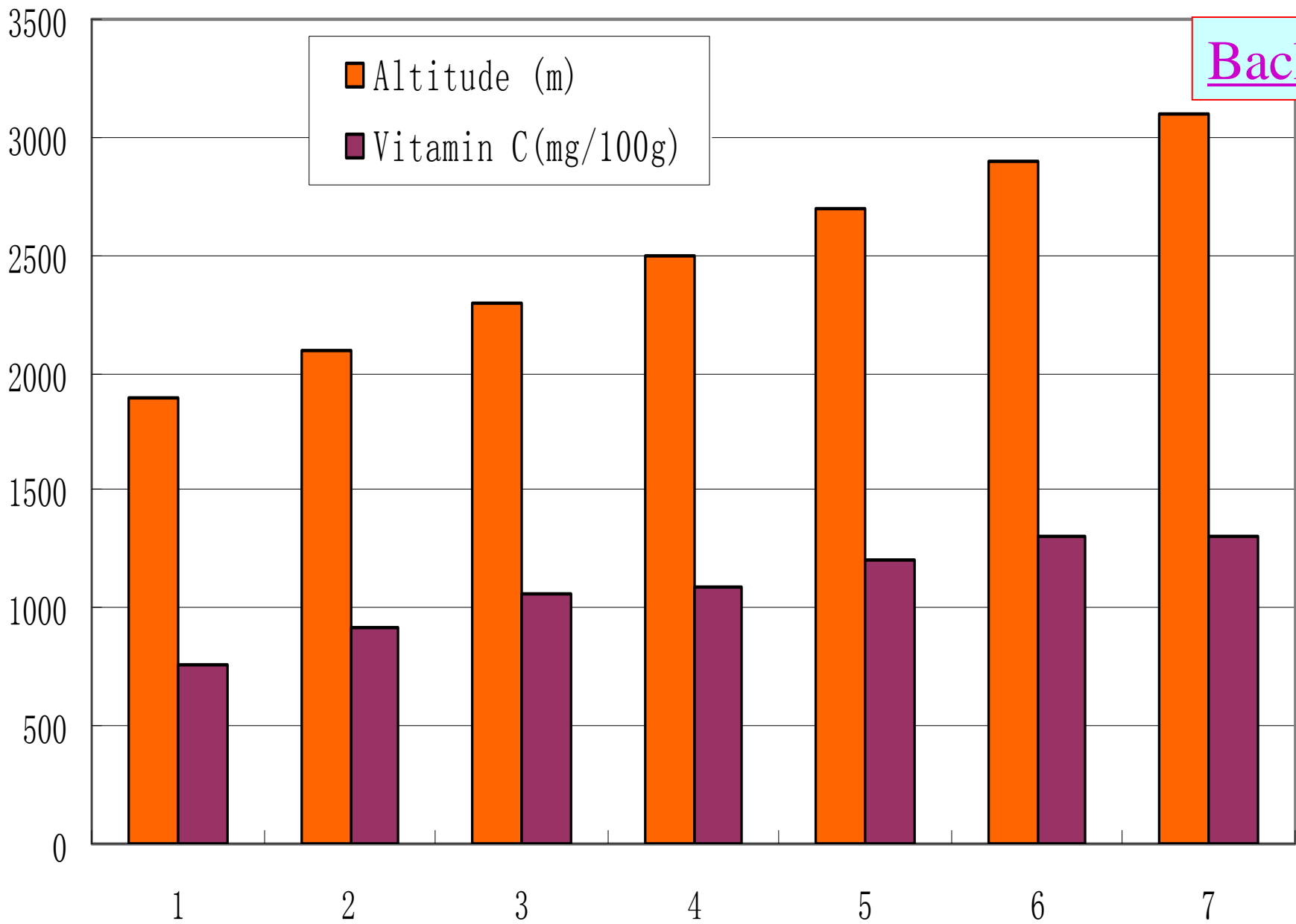
[Back](#)



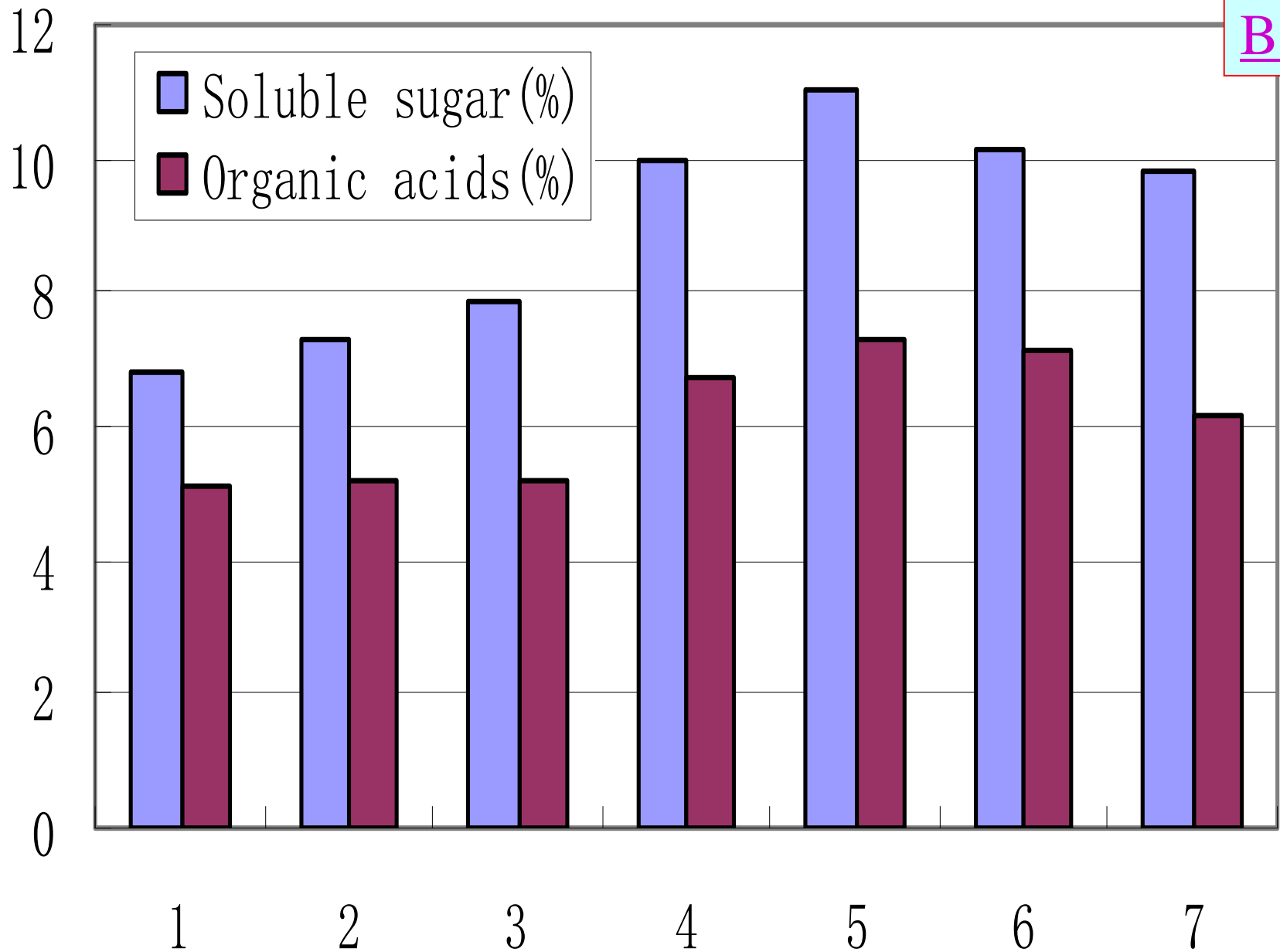
[Back](#)



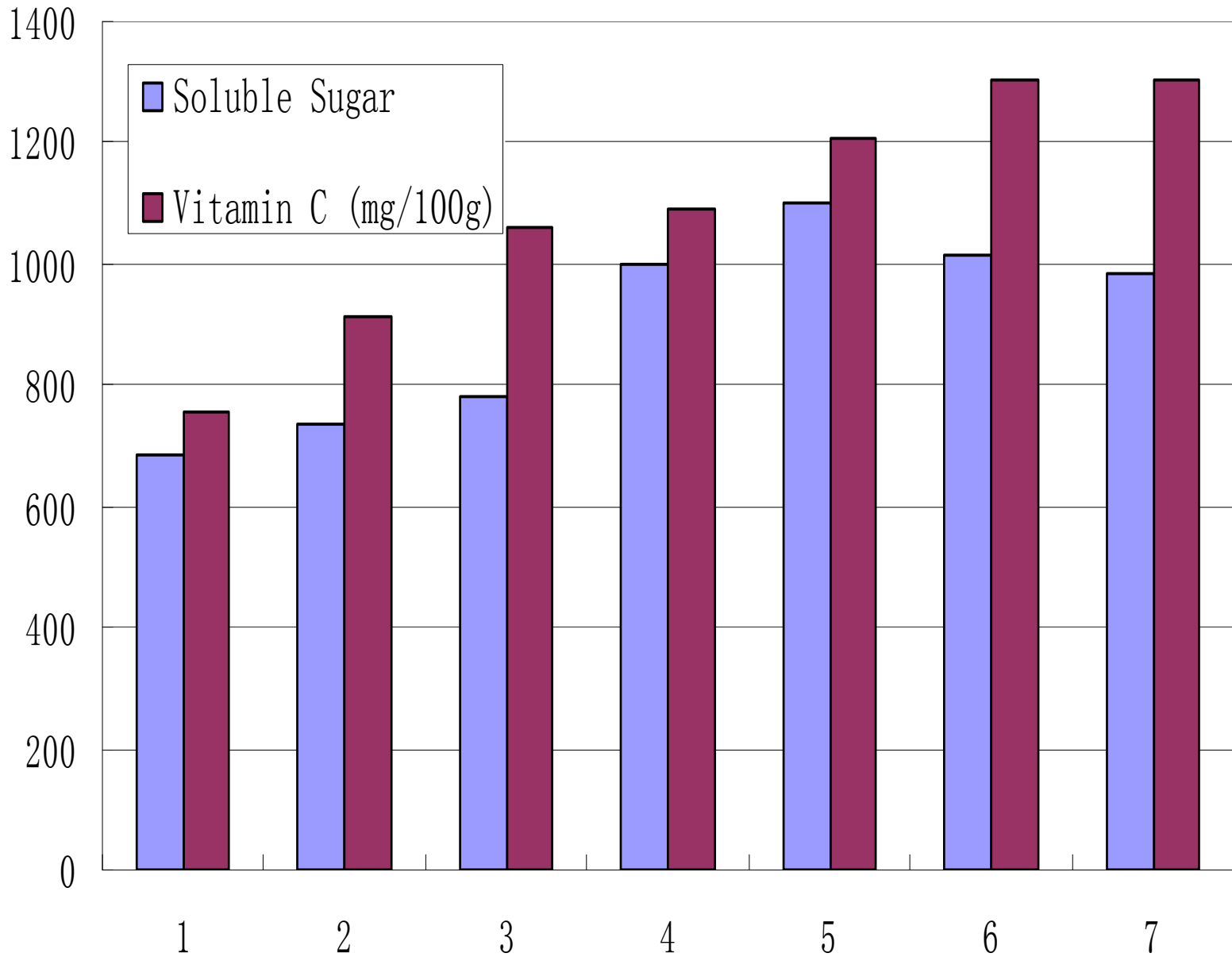
[Back](#)

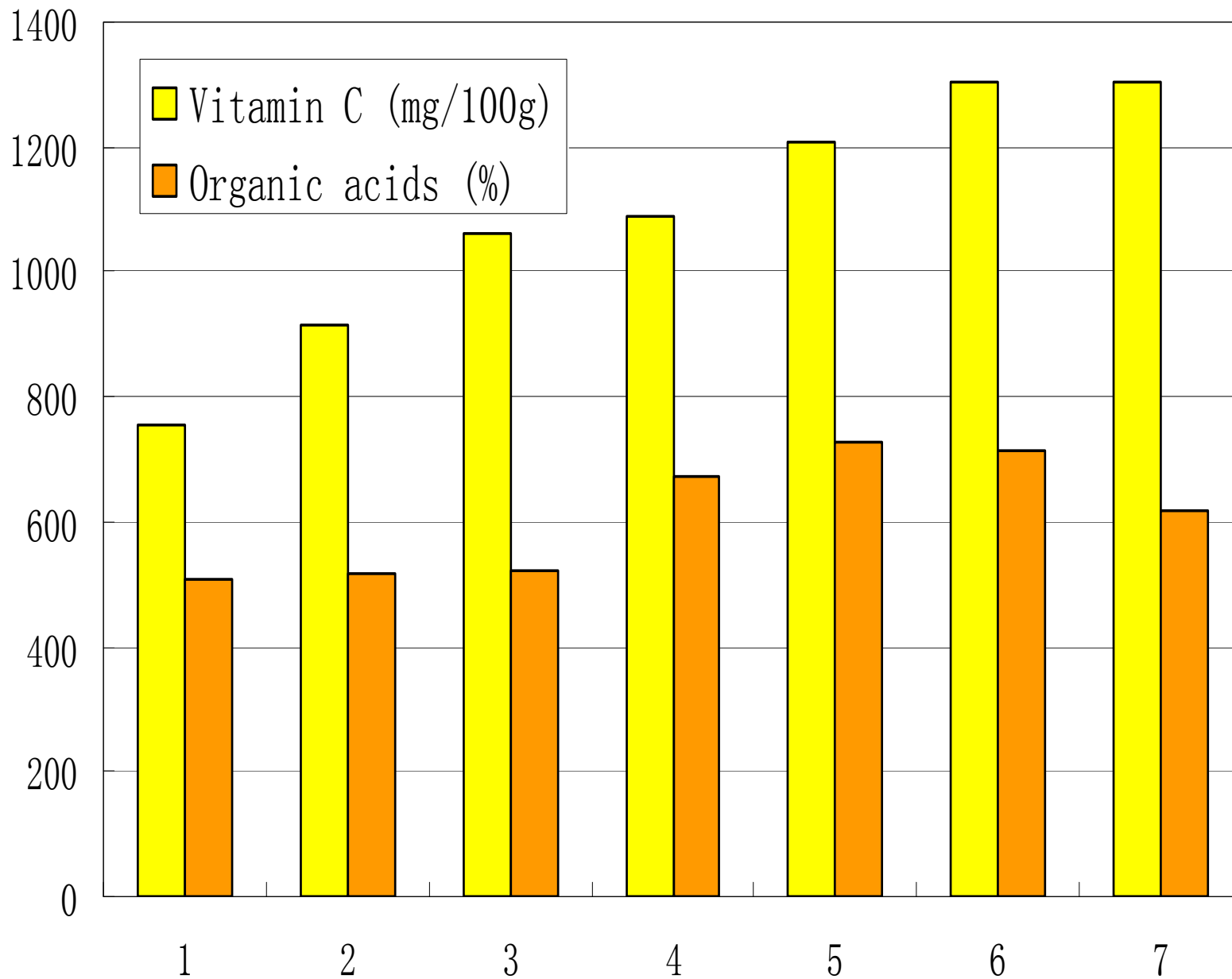


[Back](#)



[Back](#)





[Back](#)