Study on Dormancy Stage of Winter Bud of Grape

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Abstract. Winter bud dormancy of grape cultivated in high temperature, humidity and low solar radiation areas of Sichuan Province experienced three stages of similar dormancy, internal dormancy and ecological dormancy. Around mid-October, it is the similar dormancy stage, and from mid-October to late-December, it is the internal dormancy stage. In early January, it enters the ecological dormancy stage. 2.5% cyanamide treatment could break the dormancy of winter buds of 'Summer black' and 'Xiangyue' grapes.

1. Materials and Methods

1.1 Overview of pilot sites
The experiment was carried out on Siyou Grape Farm in Yongan Town, Shuangliu County, Chengdu. Shuangliu County, Chengdu City, This Farm is located on the southwest edge of Chengdu Plain. It belongs to subtropical monsoon humid climate, and the altitude is about 480 m. The climate is mild throughout the year, January being the coldest month with a mean temperature of 5.5 °C, and July is the hottest month with an average temperature of 25.1 °C, and July is the hot test month with an average temperature of 25.1 °C, and July is the hot test month with an average temperature of 25.1 °C, and July is the hot test month with an average temperature of 25.1 °C. The average annual precipitation is about 875.2 mm, sunshine hours 1067 hours, and an average annual relative humidity being 84% [1]. The climate is characterized by the early recovery of temperature in spring, faster and rich in heat. In early summer, the temperature is moderate and the daily difference is large. It is rainy in midsummer, the light is strong. Autumn rain is accompanied by much humidity and less light. There is not severe cold in winter, so it is easy to appear continuous foggy weather. This experimental site is mainly sandy soil [2]. The fertility conditions are the same and sprinkle irrigation was used. The row spacing of 'Xiangyue' grape is 3.0 m, and the plant spacing is 1.0 m, the double cross V frame being 1.0 m, and the row spacing of 'Summer Black' grape being 3.0 m, the plant spacing being 1.0 m 1.5 m, the double cross V frame being used.

1.2 Test materials
Triploid seedless grape 'Summer Black', which is a European and American hybrid variety. Originated in Japan, it was bred by the seedless white hybrid of tetraploid Jufeng and diploid. New varieties were registered in 1997 and introduced into China one after another after 1999. After introduction, they were popularized in a large area in China. The variety is thick and sweet and refreshing, the tree being strong, the growth being prosperous, and the bud eye germination rate and branch rate are high, the hidden bud life being long, the flower bud being easy to differentiate, the disease resistance being strong. The comprehensive character is excellent in the early maturing variety, which has become one of the main fresh grape varieties in our country. The tetraploid of 'Xiangyue' Grape was selected by Shenyang Rose(7601) from Liaoning Academy of Agricultural Sciences, and was selected from the parent of the best bud of purple perfume(8001), registered in 2004[3]. The ear is short conical, and the
ear shape is neat and compact, the grain of fruit being round, the fruit surface being blue and black, the skin of fruit being thick, and the fruit powder being large. The fruit meat is fine, soft and hard, with plenty of fruit juice, no meat bag, with rose smell and rich fragrance, and the taste is similar to that of rose. 'Xiangyue' plants have strong growth potential, moderate germination and strong secondary bud germination. The storage rate of fruit is very high, and the new junction strength is strong. In 2005, 'Xiangyue' had strong resistance to downy mildew and white rot of grape, and the resistance to downy mildew and white rot of grape was significantly stronger than that of Jufeng. Pests are light and adaptable.

1.3 Experimental Method
From October 2, 2015, through February 4, 2016, sampling of the branches of the strong grape (1a) under the condition of rain-proof cultivation with an interval 15 days. Single-budcutting 60 branches in perlite: vermiculite 1:1 cutting plate, among them, 30 buds were treated with 2.5% cyanamide, and the other 30 buds were coated with clean water and cultured in a light incubator (JSN-PC, Ningbo Electromechanical Industry Research and Design Institute). The temperature, day-night cycle, light intensity and relative air humidity in the incubator were 25±1 °C, 12h-12h, 2000 lx and 75 %-90 % respectively. Daily statistical germination rate, the cognizance of germination is the rupture of its scales by wrapping it, when green is visible. Within 30 days, the date of germination rate more than 50 % was used as through the dormancy time.

2. Results and analysis

2.1 Natural Dormancy Stages Of Grape

![Fig. 2-1 The germination rate of grape winter bud in different dormancy degree](image)

The germination of grape buds was shown in Fig 2-1 and Fig 2-2 that after the suitable temperature and humidity conditions of 'Summer Black' and 'Xiangyue' grape cuttings were given under rain shelter cultivation conditions. On October 15, 2015, the germination rate of grape winter bud of 'Summer Black' and 'Xiangyue' was higher than 63.33 %, and the germination rate of 'Summer Black'...
The germination rate of grape winter bud of 'Summer Black' and 'Xiangyue' was less than 50%, and this status lasted until 7 January 2016. After 105 days, the lowest germination being 3%, this status appeared on 26 November 2015; this status lasted until 7 January 2016. After 90 days, the lowest germination being 3.3%, it appeared on 10 December 2015 and explained that the period of dormancy that 'Xiangyue' grape showed longer than 'Summer Black'.

2.2 Effect of cyanamide on the dormancy phase of grapes
As can be seen from Figure 2-1, the sprouting rate that treated with 2.5% cyanamide is higher than the untreated group. Before October 15, 2015, the germination rate of winter buds of the treated 'Xiangyue' and 'Summer Black' grapes was higher than 75%, and the germination rate of 'Summer Black' grape was 7% higher than that of 'Xiangyue' grapes. On October 29, 2015, the germination rate of 'Summer Black' grapes treated with 2.5% cyanamide was 36.67%, and the germination rate of 'Xiangyue' grapes treated with 2.5% cyanamide was 33.33%. The germination rate is lowest before and after December 10, 2015, and the lowest germination rate was 6% and 8%. On December 24, 2015, the germination rate of 'Summer Black' grape was 83.33%, and the germination rate of 'Xiangyue' grape was 77.8%. The days of the germination rate above 50% that the two varieties grapes treated with cyanamide are shorter than those without treatment, and the treated 'Summer Black' grapes are 15 days earlier than the untreated 'Summer Black' grapes; the germination of 'Xiangyue' grape is 30 days earlier than the untreated 'Xiangyue' grape.

2.3 Discussion
Plants usually adopt dormant means to resist the stress of adversity. Dormancy can enhance the resistance of plant organs and tissues to adversity. It is relatively static, does not absolutely stop all life activities, and is a kind of a biological adaptation of plants against stress[4-5]. For deciduous fruit trees, dormancy is a kind of ability that plants evolved to adapt to low temperature ecology during evolution. On the other hand, under natural conditions, the necessary condition for breaking natural dormancy of deciduous fruit trees is the accumulation of low temperature for a certain period of time[6-7], without sufficient low temperature accumulation, could not germinate and grow normally[8]. Insufficient low temperature will cause the fruit tree dormancy to not be broken normally, and the growth and development of the tree will also be abnormal, such as delayed growth of the tree, low germination rate, irregular germination, flower buds shedding[5,7-9], yield and fruit quality decline, tree life shortened, seriously affecting the production of normal fruit trees[5,7-10].

In this experiment, we found that the dormancy depths of 'Summer Black' and "Xiangyue" two grapes were in the dormant stage before October 15, 2015, and the effect of apical inhibition was removed, and the appropriate temperature was given. They can germinate under the humidity condition and the germination rate is higher than 63.33%. After that, the winter buds of the two varieties are removed from the influence of the apical inhibition. Under the condition of appropriate temperature and humidity, the germination rate is less than 50.96. Beginning to enter the inner dormancy period, and the average temperature in the shelter is maintained at about 17 c. It is not as dormant in the low temperature period, and the germination of winter buds does not encounter low temperatures below 7.2 c around December 11. And the temperature has a rising trend. At this time, the dormancy of the two varieties of grapes has become hallow. It can be seen that there is no certain relationship between the low temperature requirement below 72 c and breaking the winter bud dormancy. It can be speculated that the high temperature, wet and widowed areas avoid rain. It is a natural phenomenon that cultivated grapes enter the inner dormancy, which is different from the dormancy that enters the bad environment.

After the end of December 2015, as the temperature increased, the germination rate of the two varieties of 'Summer black' and 'Xiangyue' was over 50%. It can be seen that the two varieties of grapes entered ecological dormancy in January period. The two grapes-treated with cyanamide show
the lowest germination rate on December 10, 2015, and the germination rate exceeded 50% on December 24, 2015, which can respond to external signals. On the one hand, the dormancy of grape buds is their intrinsic mechanism against undesirable conditions. On the other hand, it shows that cyanamide can break the dormancy of grape winter buds and make it enter the germination state in advance.

|                | 2015/10/1   | 2015/10/15  | 2015/10/29  | 2015/11/12 | 2015/11/26 |
|----------------|-------------|-------------|-------------|------------|------------|
| Summer Black Cyan amid | ![Image](image1) | ![Image](image2) | ![Image](image3) | ![Image](image4) | ![Image](image5) |
|                | 2015/12/10  | 2015/12/24  | 2016/1/7    | 2016/1/21  | 2016/2/4   |
| Xian gyue Cyan amid | ![Image](image6) | ![Image](image7) | ![Image](image8) | ![Image](image9) | ![Image](image10) |
|                | 2015/10/1   | 2015/10/15  | 2015/10/29  | 2015/11/12 | 2015/11/26 |
| Summer Black Cyan amid | ![Image](image11) | ![Image](image12) | ![Image](image13) | ![Image](image14) | ![Image](image15) |
|                | 2015/12/10  | 2015/12/24  | 2016/1/7    | 2016/1/21  | 2016/2/4   |
| Xian gyue Cyan amid | ![Image](image16) | ![Image](image17) | ![Image](image18) | ![Image](image19) | ![Image](image20) |
Figure 2-2 Germination and morphological development of dormant winter bud treated with cyanamid in 30 days.

Fig 2-2 the germination of grape winter bud with different dormancy degree in 30 days

Description: 2015/10/01, 2015/10/15, 2015/10/29, 2015/11/12, 2015/11/26, 2015/1210
2015/12/24, 2016/1/7, 2016/1/21 2016/2/4 is the date of executing cuttings, respectively.

Explanation: 2015/10/01, 2015/10/15, 2015/10/29, 2015/11/12, 2015/12/6 2015/12/10,2015/12/24.
2016/01/07, 2016/02/01. 2016/02/04 is the date of collecting morphological data, respectively.

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