Flowering of *Prunus cerasoides* D.Don in its Native Land (The Himalayas) and Some Other Countries in Asia

Umed Kumar Pun[1*], Sudhir Shrestha[2] and Nirajan Bhandari[3]

[1] *King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand*
[2] *Floriculture Development Centre, Lalitpur, Nepal*
[3] *College of Natural Resource Management, Agriculture and Forestry University, Pakhribas, Dhankuta, Nepal*

***CORRESPONDING AUTHOR:**

Umed Kumar Pun
Email: umedpun@gmail.com

ISSN : 2382-5359(Online), 1994-1412(Print)

DOI:
https://doi.org/10.3126/njst.v22i2.85241

Date of Submission: 15 Mar, 2024

Date of Acceptance: 11 Jul, 2024

ABSTRACT

Prunus cerasoides D. Don is the botanical name of the Himalayan cherry and is distributed in the Himalayas and other regions of Asia. Time to defoliation, time to flowering, and flower colour were reviewed in the research database such as Google scholar, ResearchGate and Google. Survey was also carried out in Kathmandu valley, Pokhara, Chitwan of Nepal and Chiang Rai of Thailand to understand the stated parameters. Three colours of flowers were observed in the Himalayan cherry: light pink, white and pink. In the similar locations, light pink type cherry tree flower earlier followed by white whereas flowering was late in pink type flowers. Altitude of the location influenced the time to flower induction and the trend was observed in all the types. This probably could be triggered by lower minimum temperature and was found important to influence flowering time in contrast to the geographical location in the Himalayan region. In South Asian countries, Himalayan cherry flowers from mid part of October to January. However, flowering of Himalayan cherry was found to be in November-December (Japan), December-January (Vietnam), December-February (Thailand) whereas flowering was twice (March-April and August-September) in Indonesia.

Keywords: Defoliation, Flowering, Himalayan Cherry, *Prunus cerasoides*

1. INTRODUCTION

Prunus cerasoides is the name of the species for the Himalayan cherry and its Nepali name is Painyu. It has similar vernacular names in different places such as Bhenkal (Uttarakhand, India), Pajja (Himachal Pradesh, India), Dieng Kaditusoo (Meghalaya, India), Tlaizawng (Mizoram, India) and, Nang Phaya Sua Krong (Thailand). Himalayan cherry is found in the mid hills of Nepal and has been reported from several districts especially from Lumbini Province, Gandaki Province, Bagmati Province, and Koshi Province of Nepal (*Pun et al* 2023). Unlike its

popular cousin, the Sakura (*Prunus serrulata*), it is not so familiar globally but, in the Himalayan region, where it originates, it is becoming popular recently. In the Himalayan region, cherry primarily flowers in autumn-winter that ranged anywhere from October to December depending on the altitude of the locations. The flowering period of the Himalayan cherry may range from two to three weeks after first flowering. The parks, towns and forest are laden with cherry blooms during the flowering season. There is even weeklong Himalayan cherry festival celebrated in the mid November at Shillong, Meghalaya since 2016 (Govil 2018).

Despite of the recent popularity, this tree species is still not much researched for its ornamental value. This tree species has been found important for bee keeping in the hills, as fodder for the cattle (Tiwari *et al* 2009) and as important framework tree species for restoring evergreen forest in northern Thailand (Pakkad *et al* 2003). The plant is reported to exist in the northern and north-eastern hill states of India, hills of Nepal, Pakistan, Bhutan, Myanmar, China, Thailand (Kerby *et al* 2000) and Indonesia (Kurniwan *et al* 2021). This research attempted to review and record the existence of this species in the region. In addition, it also recorded the location of the city or town where this tree has been reported flowering with Global Positioning System (GPS), record defoliation and flowering time, and colours of flowers.

2. MATERIALS AND METHODS

Relevant information regarding *Prunus cerasoides* was generated from electronic database such as Academic Journals, Google scholar, ResearchGate, Google, and eFloraofIndia (https://efloraofindia.com). Information of interest were time of defoliation, flowering time, and colour of flowers from the Himalayan region and other regions in Asia where it is reported. Flower colours were assessed visually both from the internet or physically. Data in Nepal was generated by visiting the site of tree during the time of defoliation and flowering whereas information from other countries were accessed through literature. Survey was done in Kaski, Chitwan, Lalitpur, Bhaktapur, Kathmandu of Nepal, and Chiang Rai of Thailand. Detail of geographical location such as GPS was derived from the internet database. Climatic data of the location of interest was derived Climate Data (https://en.climate-data.org) and compared with the time of flowering to understand critical factor influencing flower induction.

3. RESULTS

3.1 Defoliation, Flowering, and Flower Colour of Himalayan Cherry in Nepal

The defoliation and flowering of Himalayan cherry in Nepal occurs in autumn-winter (Table 1). However, time of defoliation of leaves was influenced by type of flower colour and altitude. Defoliation occurred earlier on trees bearing light pink, followed by white and pink flowers. This characteristic showed similar trend irrespective of the locations. Similarly, defoliation occurred earlier in higher altitude in contrast to lower altitude, but the trend of light pink flower flowering earlier than others was observed. Light pink was the earliest to defoliate at 1875 meters above sea level (masl), (first week of October), followed by 1560masl (second week of October). White defoliated at 1875masl (second week of October), followed by 1560masl (last week of October), and at 415masl (last week of December). However pink defoliated at 1875masl (third week of October) and 1560masl (last week of October). The difference in defoliation time of light pink Himalayan cherry tree was one week between 1875masl and 1560masl. However, in white Himalayan cherry tree, the difference in defoliation time was two weeks between 1875masl and 1560masl but the difference was more when the altitude was much lower (250masl) (ten weeks as compared with 1875masl and eight weeks as compared with 1560masl). In pink Himalayan cherry, the difference in defoliation time was one week between 1875masl and 1560masl. Time taken from defoliation to flowering ranged from one to three weeks and consistently it was one week with light pink type but one to three weeks in white and two weeks in pink type across the altitude types.

Types and altitude seem to influence the time to flowering in Himalayan cherry (Table 1). Light pink seems to flower earlier than white and pink types. Himalayan cherry in higher altitudes flowered much earlier than the lower altitudes. In case of light pink Himalayan cherry, flowering began in second week of October in Shivpuri, Kathmandu (1875masl), third week of October in Godavari (1560masl), second week of November in Bhaktapur (1401masl) and Ilam (1206masl) and first week of December in Pokhara

(822masl). Similarly, in case of white Himalayan cherry, flowering began in the third week of October in Shivapuri, Kathmandu (1875masl) and second week of November in Godavari, Lalitpur (1560masl) and third week of January in Chitwan (250masl). The trend was alike in the case of the pink Himalayan cherry too. Flowering was much earlier (first week of November) in Shivapuri, Kathmandu (1875masl) as compared to Bhaktapur (1401masl; third week of December). There was no influence of the latitudes and longitudes of the observed locations within the geographical range of (26.9099°N to 28.2096°N) and (83.9856°E to 87.9283°E).

Table 1: Time of defoliation, flowering, and flower colour of Himalayan cherry in Kathmandu valley of Nepal

Location	Altitude (m)	GPS coordinates	Defoliation time	Flowering time	Colour of flower
Shivapuri-Nagarjun National Park, Kathmandu	1875	27.6016°N 85.3653°E	First week of October	Second week of October	Light pink
Shivapuri-Nagarjun National Park, Kathmandu	1875	27.6016°N 85.3653°E	Second week of October	Third week of October	White
Shivapuri-Nagarjun National Park, Kathmandu	1875	27.6016°N 85.3653°E	Third week of October	First week of November	Pink
Floriculture Development Center, Godavari, Lalitpur*	1560	27.6016°N 85.3653°E	Second week of October	Third week of October	Light pink
Floriculture Development Center, Godavari, Lalitpur*	1560	27.6016°N 85.3653°E	Last week of October	Second week of November	White
National Botanical Garden, Godavari, Lalitpur*	1560	27.6016°N 85.3653°E	Last week of October	Second week of November	Pink
Pokhara, Kaski*	822	28.2096°N 83.9856°E	Last week of November	First week of December	Light pink
Sericulture Development Center, Bhandara, Chitwan	250	27.771°N 84.602°E	Last week of December	Third week of January	White

Source: Field survey October 2022 to January 2023

*Surveyed two years (October 2021 to January 2022 and October 2022 to January 2023)

3.2 Types of Himalayan Cherry

Himalayan cherry based on the colour of the flowers are of three types such as light pink, white and pink (Table 1 and Photos 1-3).

Photo 1: Light Pink Himalayan cherry (Godavari, 1560masl, PC: Sudhir Shrestha)

Photo 2: White Himalayan cherry (Godavari, 1560masl, PC: Sudhir Shrestha)

Photo 3: Pink Himalayan cherry (Shivapuri, 1875masl, PC: Sudhir Shrestha)

3.3 Flowering of Himalayan cherry in India

In India, Himalayan cherry begins flowering in high hills of Uttarakhand beginning in the third week of October followed by high hills of Himachal Pradesh in November and the northeast of India (Kohima or Shillong) (Table 2). In Himachal Pradesh, altitude range from 1200masl (Dalhousie) to 2276masl (Shimla) is reported to flower in November, not specified in some cases but in Dharamsala (1750masl), it flowers in second week of November. Similarly, in Uttarakhand, altitude range from 430masl (Dehradun) to 2680masl (Chapota) is reported to flower in Mid-December and third week of October respectively in light pink types. However, the pink colour Himalayan cherry is reported to flower in the first week of November at Chapota (2680masl). Flowering of Himalayan cherry in the northeast is reported in the second week (Shillong) and third week (Kohima) of November. There is no clear influence of the latitudes and longitudes of the various locations; (32.5395°N to 25.5788°N) and (75.9709°E to 94.1086°E). The flowering trend of the Himalayan cherry in India is similar to Nepal and is influenced by types (light pink flowers earlier than other) and altitudes (earlier flowering in higher altitudes than lower).

Table 2: Flowering of Himalayan cherry and flower colour in different Himalayan regions of India

S/N	Name of location	Altitude (m)	GPS coordinates	Flowering time	Flower colour	Source
1	Dalhousie, Himachal Pradesh	1200	32.5395°N 75.9709°E	November	Pink	
2	Dharmsala, Himachal Pradesh	1750	32.2190°N 76.3234°E	Fourth week of October	Light Pink	
3	Shimla, Himachal Pradesh	2276	31.1048°N 77.1734°E	November	Light Pink	
4	Dehradun, Uttarakhand, India	430	30.3165°N 78.0322°E	Mid-December	Light Pink	
5	Chapota, Uttarakhand, India	2680	30.3462°N 79.0485°E	Third week of October First week of November	Light Pink Pink	
6	Ramgarh, Uttarakhand	1518	29.4464°N 79.5596°E	Third week of October	Light Pink	
7	Kohima, Nagaland, India	1444	25.6751°N 94.1086°E	Third week of November	Light Pink	
8	Shillong, Meghalaya, India	1491	25.5788°N 91.8933°E	Second week of November	Light Pink	

Source: eFloraofIndia

3.4 Flowering of Himalayan Cherry in some Asian Countries

In some of the Asian countries, flowering time of the Himalayan cherry seem to be unaffected by altitude (Table 3). In Kurashiki (3masl), white Himalayan cherry flowered in November-December much earlier than the light pink (December-January) or pink (December-January) flowering in Chiang Mai, Thailand (310masl) or light pink (December-January) in Da Lat, Vietnam (1500masl) or Pink (January-February) in Chiang Rai, Thailand (1500masl). In Mae Fah Luang arboretum, Doi Tung (>1500masl), Chiang Rai, several Himalayan cherry trees (pink) was post peak flowering in the first week of February. Interestingly, about 1200masl on the way to Chiang Rai city from Doi Tung, the pink type of Himalayan cherry was in full bloom, suggesting the influence of altitude on flower induction. Himalayan cherry, light pink type is reported to flower twice in Cianjur, Indonesia (392masl): March-April and August-October. Flowering time of Himalayan cherry in Cianjur is different to other regions because it is in the Southern Hemisphere, and it is cold in August-October but flowering in March-April is unexplainable from temperature perspective, but other factors could be playing some role.

Table 3: Flowering of Himalayan cherry and flower colour in different regions of Asia.

S/N	Name of location	Altitude (m)	GPS coordinates	Flowering time	Flower colour	Source
1	Kurashiki, Japan	3	34.5850°N 133.7720°E	November-December	White	
2	Chiang Rai, Thailand*	1500	20.3352°N 99.8109°E	January-February	Pink*	
3	Chiang Mai, Thailand	310	18.7883°N 98.9853°E	December January	Light Pink Pink	
4	Da Lat, Vietnam	1500	11.9404°N 108.4583°E	December-January	Light Pink	
5	Cianjur, West Java, Indonesia	392	6.8168°S 107.1425°E	March-April August-October	Light Pink Light Pink	

Source: Field survey February 2023*, https://shutterstock.com (ID1605121330), https://tuoitrenews.vn/news/vietnam-life/photo (ID20231229)

3.5 Minimum Temperatures of Town and Cities in the Himalayas and other Asian Cities at the time of Defoliation and Flowering

The minimum temperature in the Himalayas when defoliation and flowering occur averaged 15°C and 12°C respectively (Figure 1). The minimum temperature was much cooler in Dalhousie and defoliation occurred at about 10°C and flowering at about 5°C as compared to other towns/cities. In other cities in Asia, the flowering occurred at varied temperatures, Kurushiki (5°C), Chiang Mai (15°C), Da Lat, and Chiang Rai (<15°C) and 18-19°C in Cianjur (Figure 2). In Cianjur, the minimum temperature is 18-20°C all through the year.

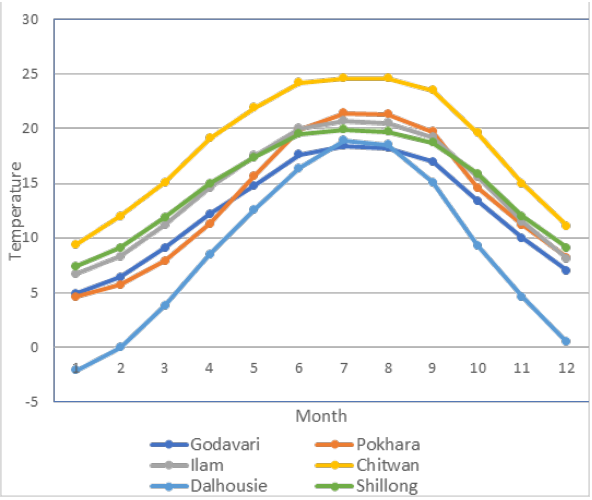

Fig.1: Minimum temperature of town/cities in the Himalayas (Source: Climate Data)

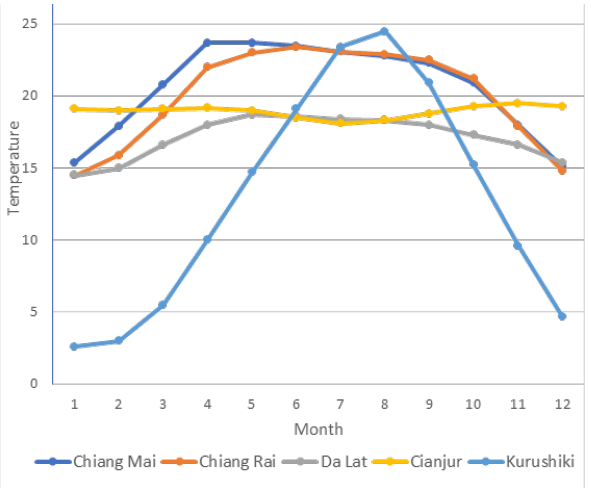

Fig.2: Minimum temperature of the cities in other regions of Asia (Source: Climate Data)

4. DISCUSSION

4.1 Types of Himalayan Cherry

Three types of Himalayan cherry were categorised based on the flower colours. They are light pink, white, and pink. All these three colours are reported from India (Joseph *et al* 2018), but this is the first reporting from Nepal.

4.2 Defoliation of Himalayan Cherry

In the Himalayan region, defoliation is influenced by the types of Himalayan cherry and altitudes. Light pink flowers earlier than others (white or pink) and therefore may need less low minimum temperature for defoliation. Higher altitude induces early defoliation of leaves and therefore it may be associated with the lowering of minimum temperature of 15°C or less. However, in the other Asian regions such as Thailand and Vietnam, the trigger is minimum temperature of about 15°C in Chiang Mai and Da Lat (the lowest temperature of the year in these locations) whereas the minimum temperature is about 5°C in Kurashiki, Japan. The defoliation in Indonesia is not very clear because it happens twice a year and the minimum temperature (18-19°C) conditions are similar all year round (Kurniwan *et al* 2021). The geographical position (latitudes and longitudes) is perhaps not influencing the leaf defoliation in contrast to the Japanese cherry (Sakura).

4.3 Flowering of Himalayan Cherry

Himalayan cherry began flowering in the Himalayas from October until January. Flowering is influenced by the type and altitude. Light pink flowers earlier than white and pink in the similar altitude and all types of Himalayan cherry flowers earlier in the higher altitude than lower altitudes in similar sequence. All colours of Himalayan cherry defoliate, and flowers based on the altitude but seems to be not influenced by the global positions. The flowering occurs when the minimum temperature is less than 12°C in the Himalayas but in the other regions, flowering occurs when the temperature is below 10°C (Kurashiki, Japan) or around 15°C in Chiang Mai, Thailand and Da Lat, Vietnam. The falling night temperature and shorter day length is perhaps associated with defoliation, flower bud initiation, flowering, and emergence of leaves. The twice flowering season in Cianjur, Indonesia is yet to be understood and needs further study (Kurniwan *et al* 2021). Could it be the southern hemisphere effect because *P. cerasoides* is also reported to flower twice in Bali of Indonesia in similar months (Oktavia *et al* 2023) unlike the single season flowering in the Himalayas and the northern hemisphere. Lack of fruition in the Himalayan cherry of Indonesia (Oktavia *et al* 2023) may be the factor that results in two flowering seasons. Himalayan Cherry of white flower colour has been reported to flower earlier at higher elevation than the lower elevation in the Sikkim Himalayan region (Lachungpa, 2012) and our data agrees to this fact. The earliest flowering begins from 7000-8000' (first week of November) (2334-2667masl), 5000' (second week of November) (1667masl) and 3000-4000' (third week of November) (1000-1333masl).

Similar, trend has been observed in light pink, white and pink Himalayan cherry in different altitudes of Nepal and India. This confirms the analogy that lowering of temperature could be the trigger factor in inducing leaf fall and accelerate flower bud emergence. Global position (latitudes and longitudes) doesn't seem to influence flowering in the Himalayan cherry unlike the Japanese cherry (Sakura) which is highly influenced and begins flowering in spring season from south and heads towards the north Japan with some exceptions. This variation in the initiation of flowering is due to early onset of spring in the south Japan as compared with the north Japan. In 2021, the earliest flowering was forecasted in Fukuoka (19th March) in southern Japan and the last was in Kushiro (10th May) in northern Japan (Anonymous 2021). The contrasting characteristics being the need of warmer temperature for flower induction of the Japanese cherry (Sakura) (few exceptions) whereas Himalayan cherry need cooler temperature for flower induction.

This clearly shows that Himalayan cherry can be planted across Nepal and enjoyed by people across the nation at different time of the year. Cluster plantation at different altitudes in villages, towns or cities or barren land in the forest could give a mass effect during the flowering season drastically improving the landscape and attracting visitors.

5. CONCLUSION

Himalayan cherry has been found distributed from South Asia to other regions of Asia. Defoliation and flowering were influenced by the types of Himalayan cherry and altitudes. The critical factor influencing these parameters could be the minimum low temperature with the onset of autumn at least in the Himalayan region. Thus, Himalayan cherry flowers between October to January in the Himalayas. This contrasts with the Japanese cherry (Sakura) that flowers with the increase in minimum temperature in Spring (March onwards). Unlike, the prevailing belief that the Himalayan cherry can be only grown in the mid hills (natural habitat), this paper shows that this beautiful tree can be grown from the highest reported altitude (2680masl, Chapota, India) to the lowest altitude (3masl, Kurashiki, Japan).

REFERENCES

Anonymous, 2021. Cherry Blossom Forecast in 2021 When to see cherry Blossom in Japan. https://en.japantravel.com/feature/cherry-blossom-in-japan

Govil, B. 2018. Lay out a picnic blanket and enjoy the Japanese art of hanami (seeing flowers) right here in our pink-coloured backyard. https://www.outlookindia.com/outlooktraveller/explore/story/69162/cherry-blossoms-bloom-early-in-shillongand-theres-a-festival-to-celebrate-it-too

Joseph, N., N. Anjum and Y.C. Tripathi. 2018. *Prunus cerasoides* D. Don: A Review on its Ethnomedicinal uses, Phytochemistry and Pharmacology. International Journal of Pharmaceutical Sciences Review and Research. 48(1), 62-69.

Kerby, J., S. Elliott, F. J. Maxwell, D. Blakesley, and V. Anusarsunthorn. 2000. Tree Seeds and Seedlings for Restoring Forests in Northern Thailand. Forest Restoration Research Unit, Biology Department, Science Faculty, Chiang Mai University, Thailand, pp. 152.

Kurniawan, V., D. M. Putri, S. Normasiwi and M. I. Surya. 2021. Phenology and morphological flower of *Prunus cerasoides* Buch.-Ham. ex D. Don. In *IOP Conference Series: Earth and Environmental Science*. 948(1), 012047. DOI: 10.1088/1755-1315/948/1/012047

Lachungpa, S. T. 2012. Green governance: policies, programmes and vision of the forestry sector of Sikkim. Forest, Environment and Wildlife Management Department, Gangtok, Sikkim.

Oktavia G. A. E., T. Iryadi, R. Warseno and H. Purnobasuki. 2023. The flowering process of *Prunus cerasoides* in Blai Botanic Gardens, Indonesia. Biodiversitas. 24(2), 1186-1191.

Pakkad, G., C. James, F. Torre, S. Elliott and D. Blakesley. 2004. Genetic variation of *Prunus cerasoides* D. Don, a framework tree species in northern Thailand. New forests. 27, 189-200. DOI: 10.1023/A:1025010403477

Pun. U. K., S. Shrestha and N. Bhandari 2023. Flowering of Himalayan cherry (Prunus cerasoides) in Nepal. Nepalese Floriculture. 26, 19-23

Tiwari, P., J. K. Tiwari and R. Ballabha. 2009. *Prunus cerasoides* D. Don (Himalayan Wild Cherry): A Boon to Hill-Beekeepers in Garhwal Himalaya. Nature and Science. 7(7), 21-23.