Relation between plant average height of \( (Cremastra appendiculata) \) and elevations

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Abstract

\( (Cremastra appendiculata) \) of treating lumbago and arthritis not only is a vital medicinal material plant, but also is a widely distributed wide plant species. This plant species is widely distributed elevation from 500m to 3100m in forest landscapes and vegetation ecosystems in Mei County of China. However, understanding dynamics of average height of this species is difficult along elevation. This research explained that the links between average height of this species and elevation are the significant positive correlation from 500m to 1500m \((P<0.01)\) as well as the links between average high of this species and elevation are the significant negative correlation from 1500m to 3100m \((P<0.01)\). This study provides six ecosystem types and a series of areas ecological adaptation for finding medicinal species. Thus, this study has vital theoretical and practical significance for medicinal plant species protection for the better future of human health and ecosystem function (service, structure) at the spatial-temporal-environmental-disturbance scales (STEDS).

Keywords: Average Height; Elevation; Correlation; Areas Ecological Adaptation; Medicinal Plant Species.

1. Introduction

More and more researches has assessed links between plant average height (biodiversity, biomass, et al.) and elevation from plant average height (biodiversity, biomass, et al.) of medicinal plant perspective\( (Table 1)\)^1-11, for better future of human health and ecosystems\(^6-14\). However, medicinal species with typical history spanning over 1500 years, and as well as areas ecological adaptation of a lot of average height of species are unknown, cognitive ecological theory of the links between average height of medicinal species and elevation can be unknown at STEDS\(^1-16\).

Thus, understanding these medical values of medicinal spices, as well as the links between co-dominance abundance dominancy of species pairs of different areas ecological adaptation and elevation is a vital ecological rule along elevation and environmental gradient in the landscapes.

\( (Cremastra appendiculata) \) not only is vital medicinal material of treating lumbago and arthritis, but also is widely distributed wide specie in Mei County of China. This specie is belonging to Cremastra genus of Orchidaceae families of Monocotyledoneae in Angiospermae. Understanding average height of this species is unknown along elevation, however\(^20-22\). Indeed, our research not only explained that there are links between average height of this species and elevation, but also explained that this species is a medicinal plant of treating lumbago and arthritis by better health.
Therefore, there are vital rules of the correlations between the average height of plant species (*Cremastra appendiculata*) and elevation in vegetation landscapes of Mei County of China.

### 2. Material and methods

**Table 1** Links between medicinal plant structure number (biomass, height) and elevation

| Links between medicinal plant structure number (biomass, height) and elevation | Authors |
|---|---|
| Links between elevation environments and numbers of plant species at STEDS. | Liao, et al., 20101. |
| Links between biomass of medicinal herb and elevation in wetland landscape. | Liao, et al., 2011a2. |
| Links between plant functional number and elevation in forest landscape. | Liao, et al., 2011b3. |
| Links between plant functional number and elevation in near-natural forests. | Liao, et al., 2014a4. |
| Links between herbs number and disturbance of different elevation in wetland. | Chen, et al., 20195. |
| Links between number of medicinal tree species and elevation in forestation. | Liao, et al., 2019a6. |
| Links between number of medicinal tree trunk volume and elevation at STEDS. | Liao, et al., 2019b7. |
| Links between height of medicinal tree and elevation in the natural landscape. | Liao, et al., 2019c8. |
| Links between number of tree community crown volume and elevation in forest. | Liao, et al., 2019d9. |
| Links between number of tree individual specie’s crown volume and elevation. | Liao, et al., 2019e10 |
| Links between herbs number and different disturbance of different elevation. | Liao, 2014 b11. |

#### 2.1. Typical environmental condition, situation of typical vegetation and methods of research

Typical area is local in three zones: firstly, evergreen vegetation of north subtropical zone; secondly, evergreen and deciduous coniferous and broad-leaved mixed forest of north subtropical and warm temperate transition; thirdly, deciduous vegetation of warm temperate zone in Earth. Thus, our research area is local in evergreen and deciduous coniferous and broad-leaved mixed forest in north subtropical and warm temperate transition in *Mei County* of China (Figure 1).
Figure 1 A Digital Cadaster Map and Research Methods of Typical Location of Mei County of China in Earth.

There are the long-time investing the correlations among average height of medicinal plant species and elevation from 2005 to 2019. Investing “big data” included that average height or other index of medicinal plants along environments by previous our researches at STEDS\(^{1-12}\).

Thus, there is a vital rule that the links among average height of \((\text{Cremastra appendiculata})\) and elevation along elevation and environmental gradient by “big data” of ecological investigation, qualitative analysis, quantitative statistics, cognitive ecological linguistic rules and methods\(^{5-15}\).

3. Results and Analysis
Based on “big data” of plant investigation, this species is a widely distributed wide species along elevation from 500m to 3100m. \((\text{Cremastra appendiculata})\) is a widely distributed along the different elevation from 500m to 3100m in Mei County of China. However, understanding the elevation effect on the links between the average height of individual plant species and elevation is very difficult, because different elevation effect on average height of medicinal species\(^{17-21}\).

Using the dynamics of “big data” investigation, this research suggested there are four rules:

Firstly, this research suggested that there is not only the increasing of the average height of \((\text{Cremastra appendiculata})\) with increasing of elevation from 500m to 1500m, as well as there are but also decreasing of the average height of \((\text{Cremastra appendiculata})\) with increasing of elevation from 1500m to 3100m at the STEDS in Mei County of China (Figure 2).

Secondly, this study explained that there is the significant positive correlations between average height of \((\text{Cremastra appendiculata})\) and elevation from 500m to 1500m \((P<0.01)\), as well as there is the significant negative correlation between average height of \((\text{Cremastra appendiculata})\) and elevation from 1500m to 3100m in Mei County of China \((P<0.01)\) (Table 2).

Table 2 Correlation between Individual Average Height of this Plant Species and Elevation

| Elevation (m) | Elevation From 500m to 1500m | Elevation From 1500m to 3100m |
|---------------|-------------------------------|-------------------------------|
| Average Height | 0.990**                      | -0.997**                     |

Thirdly, this research provides a good areas ecological adaptation of \((\text{Cremastra appendiculata})\) from 500m to 3100 in Mei County in China. Meanwhile, this research proposed that there is not only the better area ecological adaptation of \((\text{Cremastra appendiculata})\) from 1000m to 2000m, there is but also the best areas ecological adaptation of \((\text{Cremastra appendiculata})\) from 1300m to 1700m; because there are results that there are not only dynamics of different air environmental factors, there are but also dynamics of different soil environmental factors from 500m to 3100m by the dynamics of the links between average height of this species and elevation (Figure 2).
Fourthly, this research proposed that medicinal plant species (Cremastra appendiculata) is local in six typical ecosystem types (forest ecosystem, mixed ecosystem between forest and grassland, mixed ecosystem between forest and wetland, mixed ecosystem between forest and river, mixed ecosystem between forest and urban, mixed ecosystem between forest and rural settlement) by “big data” of medicinal plant species investing along elevation, because there may be results that there are not only dynamics of the different air environments, there are but also dynamics of the different soil environmental factors from 500m to 3100m along elevation and environments.

Thus, this research found a series of typical (good, better, best) areas ecological adaptation of (Cremastra appendiculata) of treating lumbago and arthritis along elevation gradient, as well as there is the links between average height of this medical plant species and elevation at STEDS.

4. Discussion

Understanding dynamics of medicinal plant species is very difficult. This research suggested three conclusions of links average height of (Cremastra appendiculata) and elevation:

1. This research suggested that there is the dynamic increasing of average height of (Cremastra appendiculata) with increasing of elevation from 500m to 1500m, as well as there is the dynamic decreasing of average height of (Cremastra appendiculata) with increasing of elevation gradient from 1500m to 3100m (Figure 2). There is the significant positive correlation between the average height of (Cremastra appendiculata) and elevation from 500m to 1500m ($P<0.01$) as well as there is the significant negative correlation between the average height of (Cremastra appendiculata) and elevation from 1500m to 3100m along elevation in Mei County of China ($P<0.01$) (Table 2).

2. This research provides six ecosystem types (forestation, mixed zone between forestation and grassland, mixed zone between forestation and wetland, mixed zone between forestation and river, mixed zone between forest and urban, mixed zone between forestation and rural settlement), as well as there is a series of areas ecological adaptation (a good areas ecological adaptation of Cremastra appendiculata) from 500m to 3100, the better area ecological adaptation of Cremastra appendiculata from 1000m to 2000m, the best areas ecological adaptation of Cremastra appendiculata from 1300m to 1700m) for finding (Cremastra appendiculata) by environments.

3. (Cremastra appendiculata) not only is a vital medicinal material of treating lumbago and arthritis, but also it is belonging to Cremastra genus of Orchidaceae families of Monocotyledoneae in Angiospermae, as well as it is widely distributed wide specie in Mei County of China.

Therefore, this research has a vital theoretical and practical significance for the reasonable protection of (Cremastra appendiculata) along the different environmental factors of elevation gradient in the different ecosystems, because this plant species not only is an important widely distributed wide medicinal material pant by treating lumbago and arthritis, but also there are three rules by the links between average height of (Cremastra appendiculata) and elevation in Mei County of China. Indeed, better regional regulators and local government need better planning and regulation a lot of medicinal plant management sustainability of ecosystems by the researches on average height (biodiversity, biomass, number, et al.) along elevation and environments with the methods and ways based on “big data” investigation, quantitative statistics, scientific analysis for better future of ecosystems and human health in t global, local, regional landscapes at STEDS.

5. Conclusion

This article suggests that three conclusions in Mei County of Shan-xi Province of China.

Firstly, human beings are helpless in the face of treating lumbago and arthritis. This article suggested that (Cremastra appendiculata) is a vital medicinal material plant species of treating lumbago and arthritis. And (Cremastra appendiculata) is a widely distributed wide plant species along elevation in Mei County. So, this article provides the best Chinese medicine treatment for human well-being in Chinese medical plant species field of treating lumbago and arthritis.

Secondly, this article provides the distribution elevation and six typical ecosystem types of (Cremastra appendiculata) from 500m to 3100m along different elevation gradient in Mei County.
Thirdly, this research explained that there are correlations between average height of *Cremastra appendiculata* and elevation are the significant positive correlation from 500m to 1500m (P<0.01) as well as correlations between average high of *Cremastra appendiculata* and elevation are the significant negative correlation from 1500m to 3100m (P<0.01). So, this article provides a theoretical basis for finding higher medicinal plant materials (*Cremastra appendiculata*) to resolve treating lumbago and arthritis ways by the “big data” of long-time investigation.

Therefore, this article three conclusion have key scientific and social and ecological value for the better future of human well-being and health and scientific and social and ecological research.

**Compliance with ethical standards**

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