



(RESEARCH ARTICLE)



Links between important values of (*Cremastra appendiculata*) and elevations by long-time investigation and qualitative analysis and quantitative statistics of "Big data"

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Abstract

(*Cremastra appendiculata*) of treating lumbago and arthritis not only is a vital medicinal material plant, but also it is a widely distributed wide plant species. This plant species is widely distributed elevation from 500m to 3100m in Mei County of China. However, understanding dynamics of Important Value of this species is very difficult along elevation. This research explained that links between Important Value of this species and elevation is the significant positive correlation from 500m to 1500m ($P < 0.01$) as well as the links between Important Value of this species and elevation are the significant negative correlation from 1500m to 3100m ($P < 0.01$). This study provides six natural landscape types and a series of areas ecological adaptation for finding new medical species along different elevation. Thus, this research has vital theoretical and practical significance for medicinal plant protection at spatial-temporal-environmental-disturbance scales (STEDS).

Keywords: Important Vales; Elevation; Links; Areas ecological adaptation; Medicinal species.

1. Introduction

More and more research has assessed the correlation among Important Values (biomass, average height, numbers, biodiversity) of species and elevation from Important Vales (biomass, average height, numbers, biodiversity, at al.) of medicinal plant perspective (Table 1) [1-11], for better future of human health (ecosystems) [6-11]. However, medicinal species with typical history spanning over 1500 years, and areas ecological adaptation of a lot of Important Values of species pairs are unknown, as well as cognitive ecological theory of the links between Important Values of medicinal species and elevation can be unknown along environmental gradient [3-15].

Thus, understanding these medical values of medicinal spices, as well as the links between co-dominance abundance dominance 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 Important Values of this species is unknown, however. Indeed, our research not only explained that there are links between Important Values of this species and elevation, but also explained that this species is a typical medical plant by the treating lumbago and arthritis for human better health.

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Therefore, there are some vital rules that the correlations between Important Values of this species and elevation in the different natural landscape types of Mei County of China at the STEDS by the long-time investigation and qualitative analysis and quantitative statistics of "Big Data".

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

Links between medicinal plant structure number (biomass, height) and elevation	Reference
Links between elevation environments and numbers of plant species at STEDS.	[1]
Links between biomass of medicinal herb and elevation in wetland landscape.	[2]
Links between plant functional number and elevation in forest landscape.	[3]
Links between plant functional number and elevation in near-natural forests.	[4]
Links between herbs number and disturbance of different elevation in wetland.	[5]
Links between number of medicinal tree species and elevation in forestation.	[6]
Links between number of medicinal tree trunk volume and elevation at STEDS.	[7]
Links between height of medicinal tree and elevation in the natural landscape.	[8]
Links between number of tree community crown volume and elevation in forest.	[9]
Links between number of tree individual specie’s crown volume and elevation.	[10]
Links between herbs number and different disturbance of different elevation.	[11]

2. Materials and methods

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. However, area of our study is local in evergreen, deciduous coniferous and broad-leaved mixed forest in north subtropical and warm temperate transition in Mei County of China (Figure 1).

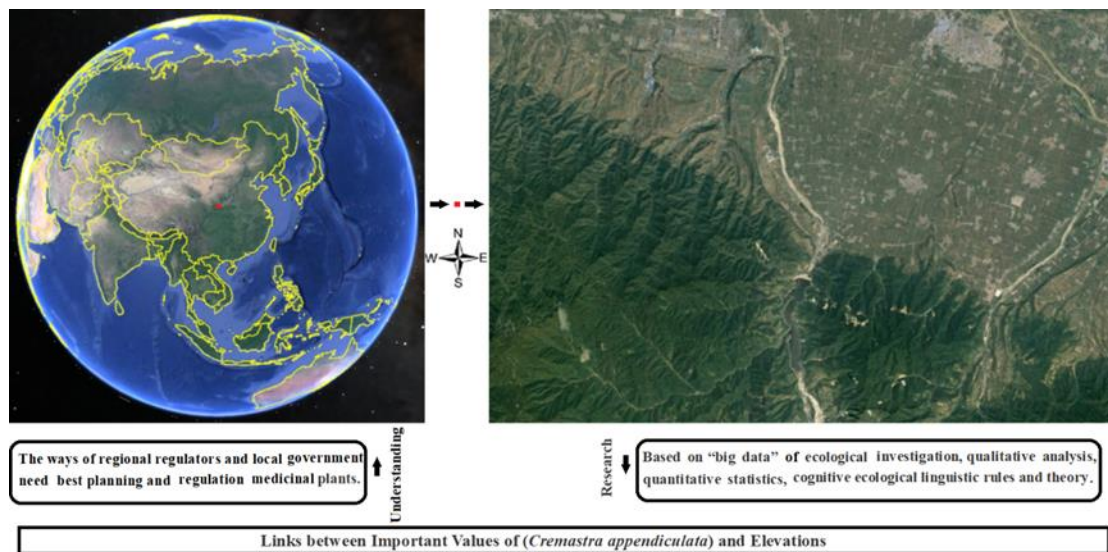


Figure 1 A Digital Cadaster Map and Research Methods of Typical Location in Mei County of China of Earth.

There are long-time investigation of links between Important Values of medicinal species and elevation from 2005 to 2019 in Mei County. Investigation of “big data” included that Important Values or other index of medicinal species along environment by our previous researches [2-15].

Thus, there is the links between Important Values of medical plant species and elevation, as well as there is a series of (good, better, best) natural landscapes areas ecological adaptation of elevation of medicinal plant species biomass by the “big data” of the ecological investigation, qualitative analysis, quantitative statistics, cognitive ecological linguistic rules, theories, methods and ways along different elevation and environmental gradient at the STEDS by the long-time investigation and qualitative analysis and quantitative statistics of "Big Data" [3-18].

3. Results

Based on “big data” of plant investigation, this species is a widely distributed wide species along elevation from 500m to 3100m. (*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 Important Values of plant species and elevation is very difficult, because elevation effect on Important Values of plant species (biodiversity, et al) [2-15, 16-24].

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

Firstly, this research suggested that there is not only increasing of Important Values of (*Cremastra appendiculata*) with increasing of elevation from 500m to 1500m, as well as there are but also decreasing of Important Values of (*Cremastra appendiculata*) with increasing of elevation from 1500m to 3100m along elevation gradient at STEDS in Mei County of China (Figure 2).

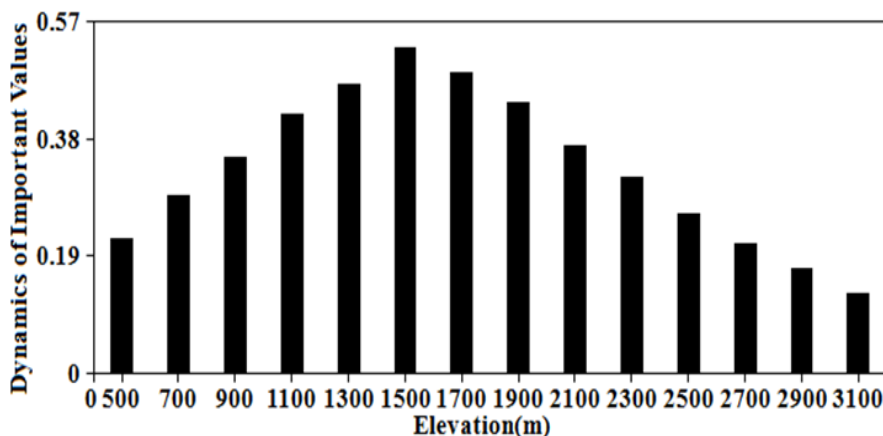


Figure 2 Dynamics of Important Values of this Plant Species along Elevation Gradient

Table 2 Correlation between Important Values of Species and Elevation

Elevation (m)	Elevation From 500m to 1500m	Elevation From 150m to 3100m
Important Values of Species	0.999**	-0.998**

Note: **, P<0.01.

Secondly, this research explained that there is the significant positive correlations between Important Values of (*Cremastra appendiculata*) and elevation from 500m to 1500m (P<0.01), as well as there is significant negative correlations between Important Values of this species and elevation from 1500m to 3100m (P<0.01) along elevation and environmental gradient (Table 2).

Thirdly, this research provides a good areas ecological adaptation of (*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 (*Cremastra appendiculata*) from 1000m to 2000m, there is but also the best areas ecological adaptation of (*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 Important Values of (*Cremastra appendiculata*) in Mei County (Figure 2).

Fourthly, this research proposed that medicinal plant species (*Cremastra appendiculata*) is local in six natural landscape (forest, natural forestation landscape, mixed natural landscape between forestation and grassland, mixed natural landscape between forestation and wetland, mixed natural landscape between river and forestation, mixed natural landscape between forestation and urban, mixed natural landscape between forestation and rural settlement) by the “big data” of Important Values of (*Cremastra appendiculata*) investigation along elevation, because there may be results that there are not only dynamics of air environments, there are but also dynamics of soil environmental factors from 500m to 3100m by the dynamics of Important Values of (*Cremastra appendiculata*) biomass along elevation gradient at STEDS in Mei County of China.

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 Important Values of this plant species and elevation gradient.

4. Discussion

Understanding medicinal species is very difficult at STEDS [1-14, 25- 29]. This research suggested three rules between Important Values of (*Cremastra appendiculata*) and elevation gradient at the STEDS by long-time investigation, qualitative analysis and quantitative statistics of “Big Data”.

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

2. This research provides six natural landscape types (forestation types, mixed types between forestation and grassland, mixed types between forestation and wetland, mixed types between forestation and river, mixed types between forest and urban, mixed types between forestation and rural settlement), as well as there is a series of areas ecological adaptation (a good areas ecological adaptation from 500m to 3100, the better area ecological adaptation from 1000m to 2000m, the best areas ecological adaptation from 1300m to 1700m) for finding (*Cremastra appendiculata*) by dynamics of Important Values of (*Cremastra appendiculata*) at STEDS in Mei County of China.

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 by the “big data” long-time investigation of Important Values of (*Cremastra appendiculata*) in Mei County at STEDS.

Therefore, this research has a vital theoretical and practical significance for the reasonable protection of (*Cremastra appendiculata*) along different elevation gradient in the different ecosystems, because this plant species not only is an important widely distributed wide medicinal material plant by treating lumbago and arthritis, but also there are three rules by the links between Important Values of (*Cremastra appendiculata*) and elevation in Mei County of China. Indeed, the better regional regulators and government need the best planning and regulation a lot of medicinal plant management sustainability of communities by the researches on Important Values of (*Cremastra appendiculata*) (biodiversity, height, biomass, number, et al.) based on dynamics of the linkages among biodiversity, elevation, environmental factors in local, regional, global natural ecosystems for the better future of ecosystem functions and human health at the STEDS [1-14, 30-39].

5. Conclusion

Treating lumbago and arthritis often influence human health in the global urban and countryside. This article suggests that (*Cremastra appendiculata*) of treating lumbago and arthritis not only is a vital medicinal plant, but also it is a widely distributed species in Mei County. So, (*Cremastra appendiculata*) is key medicinal material plant to human wellbeing in local and global landscapes. However, this article suggests this medicinal material plant species is only widely

distributed elevation from 500m to 3100m, but also understanding dynamics of the links between Important Value of this species and elevation. And the links between Important Value of this species and elevation are the significant positive correlation from 500m to 1500m ($P < 0.01$), and the links between Important Value of this species and elevation are the significant negative correlation from 1500m to 3100m ($P < 0.01$) in Mei County of Shan-xi Province of China. Therefore, this study has theoretical and practical significance for this medicinal plant protection at STEDS..

Compliance with ethical standards

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