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# LINKS BETWEEN TOTAL BIOMASS OF FRESH WEIGHT OF (CREMASTRA APPENDICULATA) AND ELEVATION IN BIOMEDICAL AND PHARMACEUTICAL PLANT SCIENCE BY LONG-TIME INVESTIGATION 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 in biomedical and pharmaceutical plant science. 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 biomass of fresh weight of this species is difficult along elevation. This research explained that the links between biomass of fresh weight of this species and elevation is the significant positive correlation from 500m to 1500m ($P<0.01$) as well as the links between biomass of fresh weight 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 new medicinal plant species. Therefore, this study has vital theoretical and practical significance for medicinal protection at the spatial-temporal-environmental-disturbance scales (STEDS).

**KEYWORDS:** biomass of fresh weight; elevation; correlation; areas ecological adaptation; medicinal species.

## INTRODUCTION
More and more research has assessed the correlation among biomass (average height, numbers, biodiversity, structure) of plant species and elevation from biomass (average height, numbers. biodiversity, structure) of the medicinal plant perspective (Table 1).[1-11] for better future of human health (ecosystems)[6-14] However, medicinal species with typical history spanning over 1500 years, as well as areas ecological adaptation of a lot of fresh biomass weight of medical species are unknown, and cognitive ecological theory of the links between fresh biomass weight of medicinal species and elevation can be unknown along elevation and environments.[12-19]

Thus, understanding these medical values of medicinal plant spices, as well as the links between of fresh biomass weight of medical species of different areas ecological adaptation and elevation is a vital rule along elevation at the spatial-temporal-environmental-disturbance scales (STEDS).

(*Cremastra appendiculata*) not only is vital medicinal material of treating lumbago and arthritis, but also is a key widely distributed wide biomedical and pharmaceutical plant. This specie is belonging to *Cremastra* genus of Orchidaceae families of Monocotyledoneae in Angiospermae. Understanding dynamics of biomass of fresh weight of this species is unknown, however. Indeed, our research not only explained that there are links between biomass of fresh weight of this species and elevation, but also explained that this species is a key medical plant species of treating lumbago and arthritis by better future of human health and ecosystem functions and procession.

Therefore, there are vital rules that the correlations between biomass of fresh weight of (*Cremastra appendiculata*) and elevation in the vegetation landscapes of *Mei County* of China.

**Abbreviation: STEDS, the spatial-temporal-environmental-disturbance scales.**

**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., 2010.[1] |
| Links between biomass of medicinal herb and elevation in wetland landscape. | Liao, et al., 2011a.[2] |
| Links between plant functional number and elevation in forest landscape. | Liao, et al., 2011b.[3] |
| Links between plant functional number and elevation in near-natural forests. | Liao, et al., 2014a.[4] |
| Links between herbs number and disturbance of different elevation in wetland. | Chen, et al., 2019.[5] |
| Links between number of medicinal tree species and elevation in forestation. | Liao, et al., 2019a.[6] |
| Links between number of medicinal tree trunk volume and elevation at STEDS. | Liao, et al., 2019b.[7] |
| Links between height of medicinal tree and elevation in the natural landscape. | Liao, et al., 2019c.[8] |
| Links between number of tree community crown volume and elevation in forest. | Liao, et al., 2019d.[9] |
| Links between number of tree individual specie's crown volume and elevation. | Liao, et al., 2019e.[10] |
| Links between herbs number and different disturbance of different elevation. | Liao, 2014 b.[11] |

**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).

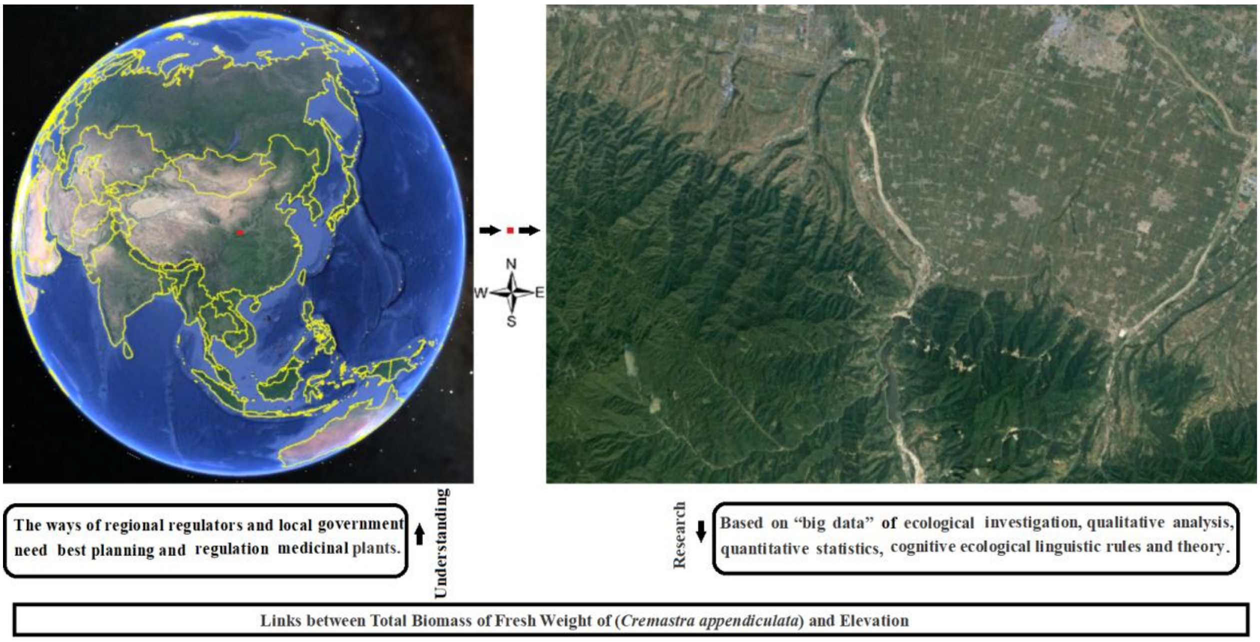


**Figure 1: A digital cadaster Map and Research methods of typical location of *mei county* of china in earth.**

There are long-time investing the correlations among biomass of fresh weight of medicinal plant species and elevation. Investing "big data" included that biomass of fresh weight or other index of medicinal species along environments by previous researches from 2005 to 2019.[2-12]

Therefore, there is the links between biomass of (*Cremastra appendiculata*) fresh weight and elevation, as well as there is a series of (good, better, best) natural landscapes areas ecological adaptation of elevation of this medical species by the "big data" of the ecological investigation, qualitative analysis, quantitative statistics, human cognitive ecological linguistic rules, theories, methods and ways by the "big data" of ecological investigation, qualitative analysis, quantitative statistics, human cognitive ecological linguistic rules and theory and methods along elevation and environmental gradient at spatial-temporal-environmental-disturbance scales (STEDS).[3-23]

**RESULTS AND ANALYSIS**

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 biomass of fresh weight of this plant species and elevation is very difficult, because elevation effect on biomass of fresh weight of medicinal species[2-14,20-26]

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 fresh biomass weight of (*Cremastra appendiculata*) with increasing of elevation from 500m to 1500m, as well as there are but also decreasing of biomass of fresh weight of (*Cremastra appendiculata*) with increasing of elevation from 1500m to 3100m at the STEDS in *Mei County* of China (Figure 2).

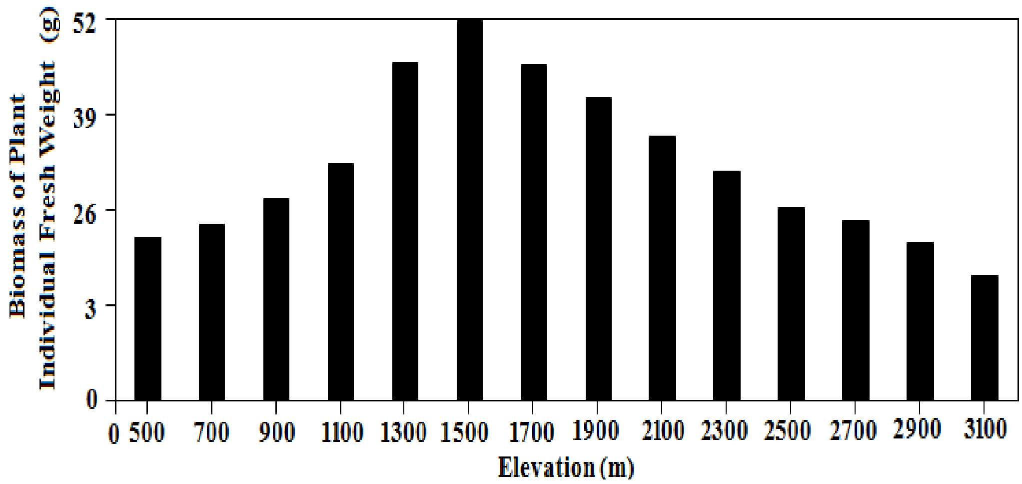


**Figure 2. Dynamics of biomass of fresh weight of *cremastra appendiculata* along elevation.**

Secondly, this study explained that there is the significant positive correlation between biomass of (*Cremastra appendiculata*) fresh weight and elevation from 500m to 1500m (*P*<0.01), as well as there is the significant negative correlation between biomass of fresh weight of (*Cremastra appendiculata*) and elevation from 1500m to 3100m in *Mei County* (*P*<0.01) (Table 2).

**Table 2: Correlation between biomass of fresh weight of this Species and Elevation.**

| Elevation (m) | Elevation From 500m to 1500m | Elevation From 150m to 3100m |
|---|---|---|
| Biomass of Fresh weight | 0.956** | -0.993** |

Note: **, *P*<0.01.

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 biomass of fresh weight of this species in *Mei County* at STEDS (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 the "big data" of biomass of fresh weight of medicinal plant species investing 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 along environmental gradient of different elevation 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 fresh biomass weight of this medical species and elevation gradient.

## CONCLUSION AND DISCUSSION

Understanding dynamics of medicinal plant species is very difficult[1-8, 27-31] This research suggested three rules between fresh weight biomass of (*Cremastra appendiculata*) and elevation:

1. This research suggested that there is increasing of biomass of fresh weight of (*Cremastra appendiculata*) with increasing of elevation from 500m to 1500m, as well as there is decreasing of biomass of fresh weight of (*Cremastra appendiculata*) with increasing of elevation from 1500m to 3100m (Figure 2). There is the significant

positive correlation between biomass of fresh weight of (*Cremastra appendiculata*) and elevation from 500m to 1500m (*P*<0.01) as well as there is the significant negative correlation between biomass of fresh weight 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 vegetation types (forestation vegetation, mixed vegetation between forestation and grassland, mixed vegetation between forestation and wetland, mixed vegetation between forestation and river, mixed vegetation between forest and urban, mixed vegetation 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 dynamics of biomass of fresh weight of (*Cremastra appendiculata*) at STEDS.
3. (*Cremastra appendiculata*) not only is a vital medicinal material of treating lumbago and arthritis, but also this plant species is belonging to *Cremastra* genus of Orchidaceae families of Monocotyledoneae in Angiospermae, as well as it is a key widely distributed wide biomedical and pharmaceutical plant by the "big data" investigation of biomass of fresh weight of (*Cremastra appendiculata*) in *Mei County* of China 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 pant by treating lumbago and arthritis, but also there are three rules by the links between biomass of fresh weight 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 biomass of fresh weight along elevation and environments with dynamics of biodiversity in the global, local, regional natural ecosystem types with the ways "big data" investigation, quantitative statistics, scientific analysis for better future of vegetation ecosystems and human health at the STEDS.[32-40]

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