

## SUPERFOOD IN MALAYSIA: THE BUTTERFLY PEA FLOWER (*Clitoria ternatea* L.)

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**Abstract:** Superfood is a term generally known as a type of food which provides many health benefits and well-being towards living things. It is a term closely related to functional food however the definition for superfood is indefinite as it is usually applied in advertising and marketing. Nevertheless, there are still many types of food that are related to the superfood term as they possess beneficial bioactive properties and high nutritional values. These foods are known throughout the world, but it is very hard to get here in Malaysia. Malaysia is a diverse country which comprises all sorts of food including edible flowers that possesses high nutritional values and bioactive properties. One of the famous known flowers is the butterfly pea flower or is called as *Bunga Telang* in Malaysia. Numerous researches have found that this flower consists of a high amount of bioactive properties and medicinal values but it is not regarded as a superfood. Hence, this review is to clearly identify the superfood term and to claim the butterfly pea flower as a type of superfood here in Malaysia. To accomplish this study, a review was carried out on topics relating to superfood and the butterfly pea flower. This study also includes the applications of the flower in food and the benefits it provides. Obtained findings on the general superfood properties were found to be synonymous with that of the flower which might consider the flower as a type of superfood.

**Keywords:** Superfood, butterfly pea flower, bioactive properties

### 1. Introduction

Superfoods are foods which can provide many health benefits towards mankind. The term superfood is closely related to functional foods but may differ in certain aspects. Functional foods are food that pertains to the health and wellness of a person where it helps improve the physical and mental wellbeing by reducing the risk of some diseases or even curing them fully while satisfying the hunger and also providing nutrients to the consumer (Tacer-Caba, 2019).

Even though the term for superfood is unclear, there are still research articles regarding some food characteristics relating to the superfood term. These foods are named for their high concentrations of vitamins, minerals, phytonutrients, and particularly antioxidants (Hegazi et al., 2021; Lakhani, 2011). In Malaysia, it is hard to find food that is deemed as superfood while this country consists of various local foods that have the potential to be one. Among the many sources that we have here in Malaysia includes edible flowers and one of them specifically is the butterfly pea flower (Mahmad et al., 2018).



## 2. Discussion

### 2.1. Superfood and its properties

Superfood is described to be a traditional or minimally processed functional food. Superfoods have the common trait of being confined in their culinary and therapeutic use, frequently in far-flung locales. A general definition on superfood is stated as a nutrient dense, antioxidant-rich, natural-food product that is minimally processed and bioavailable in numerous, potent nutritive constituents. A superfood's typical quality includes being immune system supportive and very nutritious, with remarkable concentrations of antioxidants, monounsaturated fats, dietary fibre, phytosterols, essential amino acids, vital trace minerals, vitamins and many more (Proestos, 2018). The main properties exhibited by common superfood is its antioxidant activity followed by other potential properties like antimicrobial activity, anti-cancer activity, antidiabetic activity and many more. Among the commonly known superfoods are goji berries, blueberry, pomegranate, kale, chia and quinoa (Shah et al., 2019; Proestos, 2018).

### 2.2. Bioactive properties of the butterfly pea flower

Butterfly pea flowers are reported to have various types of phytochemical properties and bioactive compounds that can be beneficial towards human health. Some bioactive compounds mentioned to be available in the butterfly pea flowers are the polyphenols family where anthocyanins are the main compounds. Other types of constituents present in this flower include the ranges of flavanols like kaempferol, quercetin and myricetin (Tacer-Caba, 2019).

The butterfly pea flower is known to have a high antioxidant potential against free radical scavenging activity as has been founded by several antioxidant detection methods such as DPPH radical scavenging activity, the ferric-reducing antioxidant power (FRAP), the reducing capacity of the Folin-Ciocalteu reagent as well as the ABTS activity.

Next, it is also found that the butterfly pea flower has an antidiabetic activity as it reduces the glycemic index of starchy food when incorporated with the extract of the flower. It was also found that consumption of the beverage with addition of sugar can help reduce the plasma glucose and insulin level (Chusak et al., 2018).

Other than that, the flower also shows anticancer potential. Several findings have noted that the extract of the butterfly pea flower shows a cytotoxicity effect against the Human peripheral B-lymphoblast DAUDI cancerous cell lines and a hormone-dependant breast cancer cell line. The constituents of the flower which was found to have been responsible for these anticancer activities are mainly ternatins, kaempferol and quercetin (Nanda, 2019).

Antimicrobial activity was also exhibited by the butterfly pea flower extracts for several types of microorganisms by measuring the inhibition zone diameter present. Some of the bacteria and fungi inhibited by this flower extract are *E. coli*, *S. aureus*, *B. subtilis*, *K. pneumonia*, *P. aeruginosa*, *Candida albicans*, *Rhizopus* and *Penicillium spp.* Other bioactive properties from the flower constituents includes anti-inflammatory activity, the anti-arthritis potential, antiparasitic effects, antiasthma and anti-aging effects (Jeyaraj et al., 2020; Nair et al., 2015).



### 2.3. Application of the butterfly pea flower in daily food consumption

There are various ways to apply the butterfly pea flower in daily consumption. According to a research, direct consumption of the flower does not give as much as when it is extracted and incorporated in foods. In Malaysia, there are several dishes being prepared using the butterfly pea flower and one of the famous dishes is the *nasi kerabu* where incorporation of the flower extract in the white rice can exhibit beneficial effects. Beverages of the flower is also a good way to obtain the health benefits. New applications of the flower in food are also being developed such as ice-creams and candies to attract better consumers and promote the health benefits of the flowers (Gaytos & Lumagbas, 2019; Mahmud et al., 2018).

### 3. Conclusion

The study has summarized that superfood is a type of food that can contribute high beneficial health factors towards humans as it possesses various bioactive properties. Among the superfoods and its characteristics, the butterfly pea flower has definite potential to be categorized as a superfood as its constituents and bioactive properties match the standard for a type of superfood. It also has many potential applications to be implemented in daily food intakes which will provide direct health benefits for consumers. Further studies are suggested to be carried out on the butterfly pea flower so that its potential can be applied widely in the food industry.

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