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STUDIES ON INTERRELATIONSHIP BETWEEN *ACACIA TORTILIS* AND ITS EPIPHYTE *TAPINANTHUS GLOBIFERUS* IN TABUK, SAUDI ARABIA.

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Abstract:

The genus Tapinanthus (Loranthaceae) are stem hemi-parasites or epiphytes, commonly known as 'mistletoes'. It *is also known as* 'Hadhal' in *Saudi Arabia. Plant is most commonly found growing on tree crops of economic importance especially Acacia sp. (Fabaceae) which is a common tree species of Tabuk region. The plant is widespread under drought stress conditions and in a variety of drier habitats of Saudi Arabia. Both the plants in this region are well known for their medicinal importance. In this preliminary experiment, interrelationship of Acacia tortilis and its epiphyte Tapinanthus globiferus was studied in terms of their biochemical composition. Both the plants were analyzed for their mineral compositions (N, P, K, Na, Ca, Mg, Cu, Fe, Mn and Zn). Screening on some photochemical was also conducted. Results showed higher mineral contents in host plant as compared to its epiphyte. However, Ca and Mg were higher in T. globiferus. Both the plants accumulate Cu and Zn in very low concentrations. Phytochemical compositionin ethanol extracts showed presence of steroids and flavonoids in A. tortilis whereas its epiphytes contain alkaloids and steroids.*

Keywords: *Acacia, Tapinanthus, epiphytes, minerals, phytochemicals*

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INTRODUCTION:

The genus *Tapinanthus* (Loranthaceae) are stem hemi-parasites or epiphytes, commonly known as 'mistletoes'. It is also known as 'Hadhal' in Saudi Arabia[1]. Mistletoes are used in different forms to cure hypertension, diabetes mellitus, inflammatory conditions, irregular menstruations, menopause, epilepsy, arthritis and cancers. But the biology of these plants is not well understood [2]. Mistletoes are now known as "cure all" and have been found beneficial as a drug/remedy for number of health problems [3].They show an ambiguous relationship with their hosts as a source of inorganic nutrients and impose competition with their host plants [4]. In Southwestern Ethiopia crushed fresh leaves of *Tapinanthus globiferus*are used as the remedy for tumors [5]. Fresh leaves mixed with root bark of *Boswella odorata* are used to cure syphilis [6]. Many species of *Tapinanthus* have been reported for antioxidant, antimicrobial [7] and hepatoprotective activities [8].The leaf extract of this plant also used to lowered cholesterol and in the management of hypertension [9].

Tapinanthus is most commonly found growing on tree crops of economic importance especially *Acacia* sp. (Fabaceae), which is a common tree species of Tabuk region. *Acacia* sp. is widespread under drought stress conditions and in a variety of drier habitats of Saudi Arabia. Both the plants in this region are well known for their medicinal importance. Epiphytes represent about 10% of flora and are extremely important plant species [10]. They maintain a balance in terrestrial ecosystems [11]. The plants of *Acacia* and its epiphyte *Tapinanthus* and their parts are medicinally important, used in the treatment of tuberculosis, diarrhea, dysentery, stomach ache, wounds and cancers [12].

MATERIAL AND METHODS:

Samples of healthy mature plants of *Acacia* and *Tapinanthus* were collected in April, 2018from Tabuk-Jorden road (760 meter above sea level). Samples were washed thoroughly, collected in plastic bags and dried in shade at room temperature. Fine powder was prepared of air-dried samples of the collected plants. About 2 g of each plant sample were used for the analysis of their mineral composition (N, P, K, Na, Ca, Mg, Cu, Fe, Mn and Zn). Ash of both the samples was prepared using oven at about 400° C for 2 h. Than20 ml concentrated HNO_3 was added to the ash and filtered into volumetric flasks of 50 ml. The final volumes were made up to the mark using distilled water. Minerals composition was determined using atomic absorption spectrophotometer (GBC, 932 plus; GBC Scientific Instruments, Braeside, Australia).Methods of Lindner [13] and Fiske and Subba Row [14] were used to measure nitrogen and phosphorus contents, respectively.

Flame photometry was used to estimate potassium [15]. The standard calibrations method was used as described by Vogel [16].50 g of each the powdered samples were charged in thimbles and extracted in 400 ml each of 98% ethanol using a Soxhlet extractor ran for 48h. Rotary flash evaporator was used to concentrate the extracts. They were than preserved at 5°C in airtight bottles for phytochemical analysis [17]. Phytochemical analysis was performed following the standard procedure by Harborne [18]. Tests for the screening of alkaloids, steroids and flavonoids were conducted.

RESULTS:

Figure 1 shows the mineral composition of *A. tortilis* and *T. globiferus*. Results showed higher minerals contents (N, P, K, Na, Ca, Mg, Cu, Fe, Mn and Zn) in *A. tortilis* as compared to its epiphyte *T. globiferus*. However, Ca and Mg were higher in *T. globiferus*. Both the plants accumulate Cu and Zn in a low concentration. In screening of some phytochemical in ethanol extracts showed presence of steroids, flavonoids, alkaloids. The host plant *A. tortilis* contains steroids and flavonoids whereas its epiphytes *T. globiferus* contain some alkaloids and steroids.

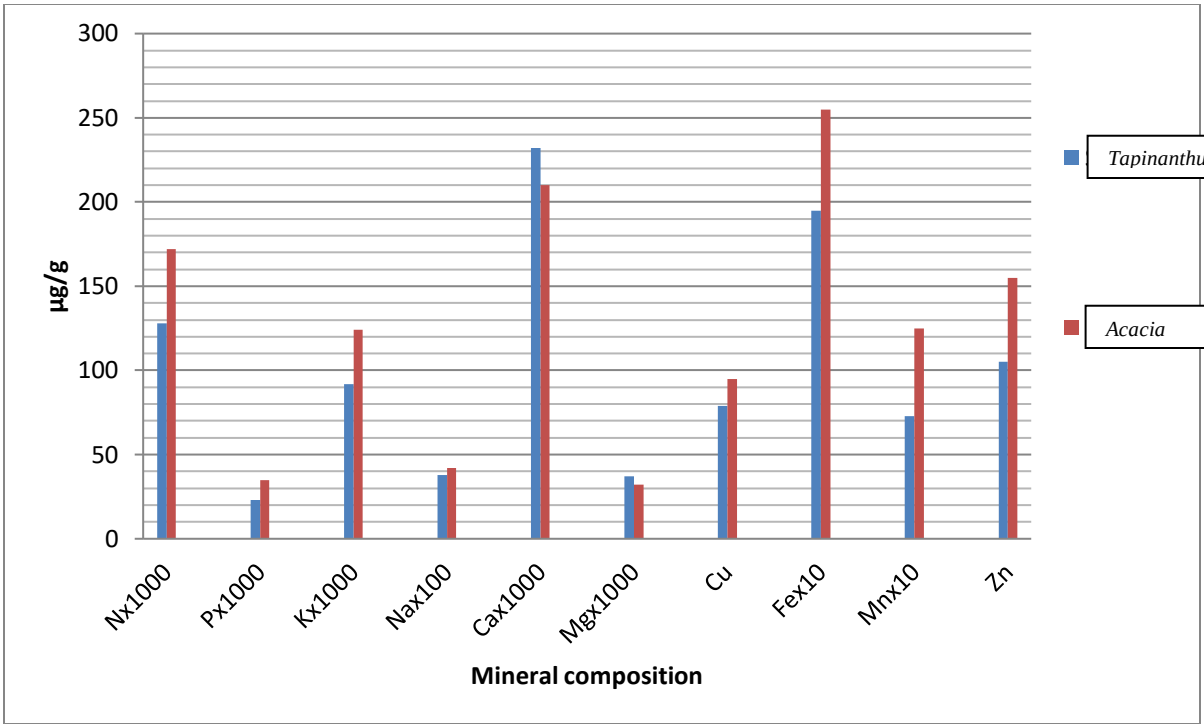

Figure 1 Mineral composition of the host *Acacia tortilis* and its epiphyte *Tapinanthus globiferus.*

DISCUSSION:

The mineral composition revealed that both the plants are enriched with various minerals and can be used as supplements in deficiency problems. Our results are also in accordance with the work of Khan et al. [19]. Minerals play an important role in the structure and functions of metabolic processes [20]. Phosphorus is important for the synthesis of many phytochemicals in plants [21]. The result also showed presence of active phytochemical in both the plants. This may likely be due to the presence of phenolic compounds [18]. The variation in chemical composition of both the plants may be due to some environmental factors [22]. The epiphytic plants like *Taphinanthus sp.* cause many biological changes in their host plants [23].The root system is either reduced or absent in these hemiparasites. So they take water and minerals from their host plants like *Acacia*. In return they provide organic carbon to their host produced when they perform photosynthesis [24, 25].

Fifteen *Acacia* species reported so far from Saudi Arabia in the kingdom. *Acacia* plants are representative of the climax stage of xerophytic stage and covered most of the part. The *Acacia* plants are economically important providing wood for fuel and timber. They are also a good source of resins, tannins and gum. They also provide space to honey bee to produce honey. Genus *Acacia* is reported for its abilities to resist the drought conditions [26]. *Acacia* is a biofertilizer, fixes nitrogen in the soil, used as fodder and a source of shade [27]. With their wide distribution in Saudi Arabia, potential for sustenance in adverse environments, *Acacia* is important attraction for research.

In Saudi Arabia, they are threatened due to human and environmental pressure, low diversity and population density. Furthermore, the attack of epiphytes like *Tapinanthus* in Tabuk region is also threatening its survival of *Acacia*.Keeping in view the above facts, it is highly desirable to explore a way to protect the *Acacia* and its epiphyte *Tapinanthus* for the survival of both species as they are economically and medicinally important for mankind. These plants are well known that is shown by the scientific literature for their ethnomedicinal and ethnopharmacological assets. They are useful as natural antioxidants and potential medicinal agents. There is a need of hour to understand the host and its epiphyte interrelationships [28]. The structure of host- mistletoe interaction should be examined at family, genera and species levels [29, 30].

CONCLUSIONS:

The host *Acacia tortilis* and its epiphyte *Tapinanthus globiferus* are rich in minerals and some phytochemicals of medicinal and economic

importance. It is highly recommended to work further on these plants to find some possible mode of actions for sustenance of both the species. More ethnobotanical studies on these plants are also required. Thorough onsite research to elucidate the interrelationship between the host *Acacia tortilis* and its epiphyte *Tapinanthus globiferus* in Tabuk region of Saudi Arabia is also required.

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