

## **Tithonia diversifolia (Hemsl.) A. Gray - a Systematic Review of its Ethnomedical Uses, Phytochemistry, Pharmacotoxicology and Clinical Relevance**

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**Ethnopharmacological relevance:** *Tithonia diversifolia* (Hemsl.) A. Gray has a long tradition of use in several cultures for medicinal purposes. With the increasing popularity of the plant and the emerging related concern for toxicity, rigorous scientific assessment of its therapeutic effects is mandatory. However, no attempt was made so far to appraise the ethnomedicinal claims of *Tithonia diversifolia* in light of existing scientific evidences.

**Aims of the review:** We critically selected, summarized and put into context available evidence on the pharmacological activities of *T. diversifolia* and their relation to traditional use, toxicology and phytochemistry, to provide perspectives for developing more attractive pharmaceuticals from plant origin and lay new foundation for future investigations on this plant.

**Materials and methods:** Information concerning the botany, traditional use, phytochemistry, pharmacology and safety of *Tithonia diversifolia* was retrieved up to May 2017 without language nor year restrictions from numerous resources including unpublished/published reports, and electronic database using mostly Web of Science, PubMed, ScienceDirect, Google Scholar and Scopus as search tools. The following keywords were used: *Tithonia*, *Tithonia diversifolia*, *Mirasolia diversifolia*, *Helianthus quinquelobus*, *Urbanisol tagetiflora*, *Urbanisol tagetiflora*, *Urbanisol tagetifolius*. Pertinent references from the retrieved reports were screened for further relevant articles. Only the reports dealing with taxonomy, global distribution, local and traditional knowledge, phytochemistry, toxicity and biological effects of *Tithonia diversifolia* were included in this review.

**Results:** We collected 5,325 published/unpublished articles, and just 1.1 % were selected for the review. Every part of the plant was reportedly used in treating and preventing myriads of ailments and diseases. Several studies conducted on cell lines and animals provided supporting evidence for some ethnomedicinal claims of extracts from *T. diversifolia*. Extracts were effective and well-tolerated when taken at lower doses. Both the toxic and therapeutic effects of the plant were attributed to the presence of biologically active principles including sesquiterpene lactones, chlorogenic acid and flavonoids.

**Conclusions:** *T. diversifolia* is a valuable source of untapped bioactive compounds with significant therapeutic implications and favourable safety index. However, more rigorously designed investigations are needed to recommend the whole plant or its active ingredients as medication, and should focus on understanding the multi-target network pharmacology of the plant, clarifying the effective doses as well as identifying the potential interactions with prescribed drugs or other chemicals.

