Nutritional and Pesticidal Activity of Leaves and Flowers of *Tageteserecta L.*

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Abstract

The Research dealswith phytochemical constituent, nutritional value and pesticidal activity of *T. erecta* of leaves and flowers. Preliminary phytochemical tests revealed that the alkaloids, α - amino acids, carbohydrates, flavonoids, glycosides, phenolic compounds, saponins, reducing sugar, tannins, steroids and terpenoids were present in *T. erecta*of leaves and flowers but starch was absent. The EDXRF method that the highest abundance percentage of K (61.865%, 49.173%) of leaves and flowers. Nutritional values of flowers and leaves will be determined by AOAC method indicating moisture content (8%, 8.59%), ash (4.48% - 15.92%), protein (12.57%, 16.13%), fiber (2.04%, 4.54%), fat (4.03%, 12.25%) and carbohydrates (41.29%, 26.92%). The Energy value of flowers and leaves of *T. erecta* is (252.43 kcal/100 g, 282.45 kcal/100 g). The pesticide activity of leaves and flowers of *T. erect*a were determined by petridish method. The EtOAc extract of both leaves and flowers have highest pesticidal activity than the other extracts in rice weevils.

Keywords: Leaves and flowers of *T. erecta*, phytochemical constituents, nutritional value, EDXRF and pesticidal activity

Introduction

*Tageteserecta*species, popular known as marigold, is known as ornamentals. It is found in different colors and different fragrance. Flower colors are red, orange and yellow. Red and orange bicolor patterns are also found.Marigolds include treating conditions, such as rashes, allergies, pain, swelling and redness caused from muscle cramps, muscular injuries or eye inflammation and itchiness caused by conjunctivitis and fungal infections, including athlete's foot, candida, ear infections and ringworm.

The leaves are used as food flavouring. The leaves are also reported to be effective against piles, kidney troubles, muscular pain, ulcers, and wounds. The flower is useful in fevers, epileptic fits, astringent, carminative, stomachic, scabies and liver complaints and is also employed diseases of the eyes. Marigold flowers are certainly a good source of carotenoids; they show very different pigmentation levels (Rodon, 2006).

The growing plant repels whiteflies and can be grown near tomatoes to keep that crop free of the insect. A yellow dye is obtained from the flowers. It is used to color foods and textiles. The flowers are used in refreshing drinks. The flowers are sometimes used as an adulterant of saffron(Salinas, 2012).

Natural insecticides were seldom used for the control of insects, after the emergence of the U.S insecticidal industry in the 1930. The notion of insecticidal compounds in marigold is not new. Numerous classes of compounds in marigolds are known that produce various biological responses in organisms but only a few are known to be insecticidal (FAO,1986).

The genus *Tagetes*, family Asteraceae, is used as an alternative for the control of pests and diseases and due to the chemical composition of their secondary metabolites, their biology acivity have provided the development of new drugs and insecticides, among others, has therapeutic properties that have been recognized since the time of the Aztecs, being used to combat various diseases .

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Pesticides are substances that are meant to control pests, including weeds.In general, a pesticide is a chemical or biological agent (such as a virus, bacterium, or fungus) that deters, incapacitates, kills, or otherwise discourages pests. Many benefits of organic pesticides have been proven to be better for the soil. Whereas chemical pesticides can abuse the land and make it difficult to use in future generations, organic pesticides help the soil maintain its nutrients and texture.

In relation to pesticides, several properties must be associated with the activities , such as effectiveness at low concentrations, no toxicity front of mammals and higher animals, easily obtainable, handling and application, economic feasibility and not be accumulated in human adipose tissue and also selective (Addor, 2003).

Pesticides are an important but often controversial component of today's integrated pest management system. As pesticides are used to kill unwanted pests, weeds or diseases, there is concern that they may harm people, wildlife and the enviroment. There are strict controls in place over their sale and use.

Pesticide products are some of the most widely tested chemicals with respect to toxicological harzard evaluation (e.g. multigeneration, developmental, reproductive toxicology testing) and human health risk assessment for example., dietary, occupational (Holland,*et al*.,1996).Pesticides have the potential to express toxicity to mammalian systems; including humans, aquatic organisms, plants and soil organisms. Pestisit of a chemical is a determined by stability or length of life in soil, aquatic enviroments, in animal and plant tissues(Racke,2003).

Materials and Methods

Collection and Preparation of Plant Samples

T.erecta of leaves and flowers are used in this study was collected from Mingalardone township, Yangon region). The flowers and leaves were peeled off and air dried at room temperature for two weeks. Then it was made into powdery by electric motor-grinder, and stored in air–tight container to prevent moisture changes and other contaminations.

Figure 1. Photograph of plants of *Tagetes erecta* (Htat-Tayar-Pyin-Thit)

Extraction of leaves and flowers of *Tageteserrecta*L.

Dried powered sample (100 g) was weighed and placed in eight different bottles. The 300 mL of different polarity of solvent such as ethyl acetate, ethanol, methanol and 400 mL of petroleum ether was added each bottles respectively and stopped withaluminium foils. The sample was allowed to macerate and placed in a shaker,shaken continuously for about 6 hours and the suspension was allowed to stand for5 days. The extracts was filtered and transferred to preweighed porcelain basin and evaporated to dryness on water bath.

Screening of pesticidal activity of leaves and flowers of *T.erecta* L. by Petri-Dish Method

Pesticidal activity was studied on ethanol, methanol, petroleum ether and ethyl acetate extracts from the samples against of rice weevils.

Pescidial activity of Crude extract dilution

From crude extract 0.015 mg ,0.03 mg and 0.05 mg was accurately weighed and serially dissolved in 1 mL of acetone. Then it was made up to 100 mL by using distilled water. Thus from each crude extract 150 ppm, 300 ppm, and 500 ppm concentration of test solution was prepared. Test solution of each of the extract was used for testing riceweevils (Makanjuola *etal.*, 1989).. Among them ethyl acetate extracts of flowers and leaves highest pesticide activity than other extracts in rice weevils.

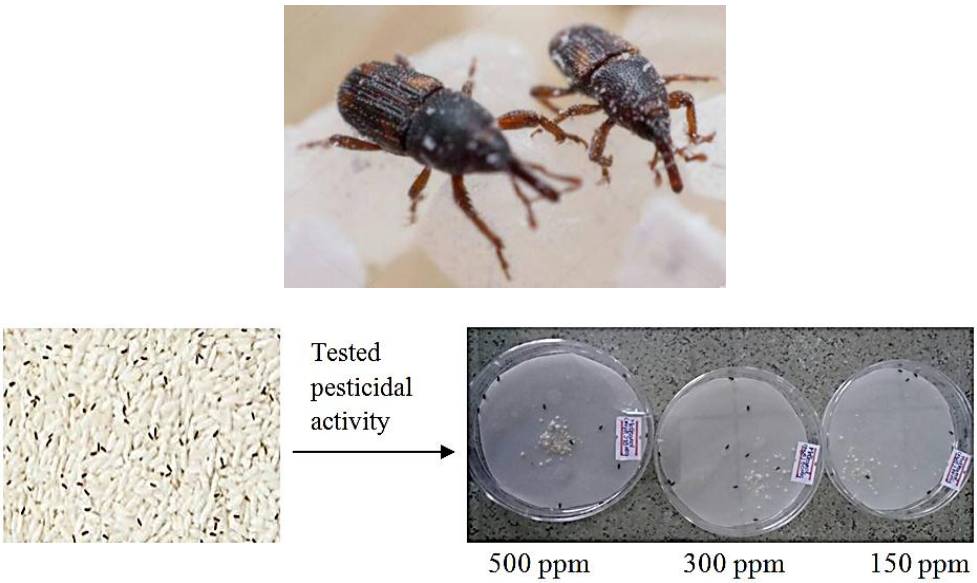

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Figure 2. Pesticidal activity of EtOAc extracts of leaves and flowers against rice weevils

Resultsand Discussion

Phytochemical Examination of Plant Samples

Preliminary phytochemical test were carried out in order to know the different types of chemical constituents present in the plants Phytochemical analysis of leaves and flowers indicated the presence of alkaloids, α-amino acid, carbohydrates, flavonoids, glycosides, phenolic compounds, saponins, reducing sugar, tannins, steriods and terpenoids but starch was absent.

Table 1. Nutritional Values of Flowers of *T.erecta* L.

No.	Parameters	Contents (%)
1.	Moisture	8.00
2.	Protein	12.75
3.	Ash	4.48
4.	Crude Fat	4.03
5.	Crude fibre	2.04
6.	Carbohydrate	41.29
7.	Energy value (kcal/100g)	252.43

Table 2. Nutritional Values of leaves of *T.erecta* L.

No.	Parameters	Contents (%)
1.	Moisture	8.59
2.	Protein	16.13
3.	Ash	15.92
4.	Crude Fat	12.25
5.	Crude fibre	4.54
6.	Carbohydrate	26.92
7.	Energy value (kcal/100g)	282.45

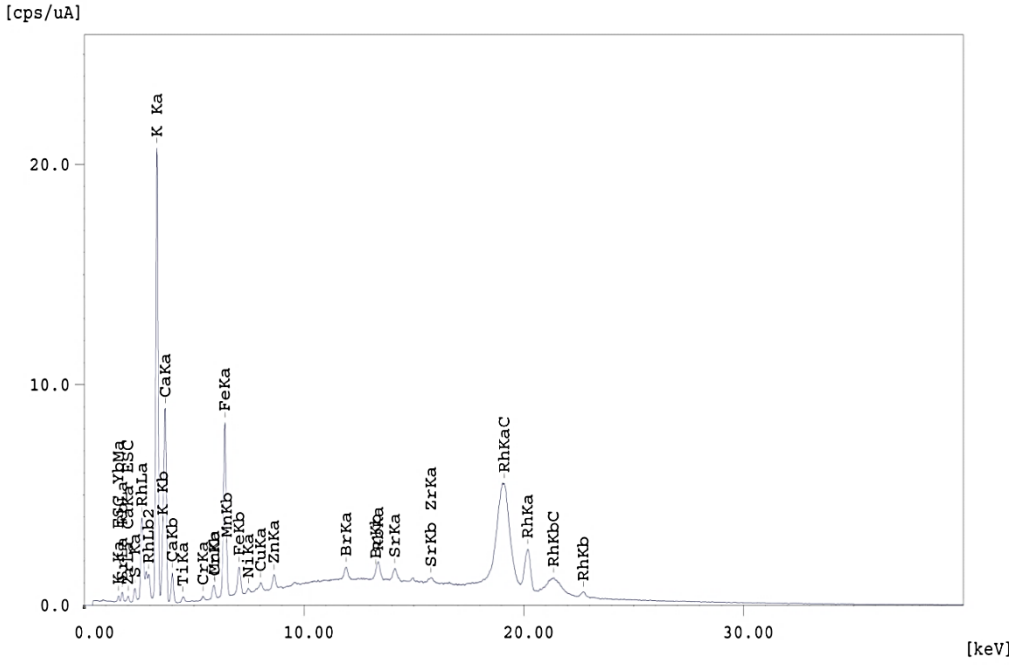

Figure 3. EDXRF Spectrum of flowers of *T.erecta*

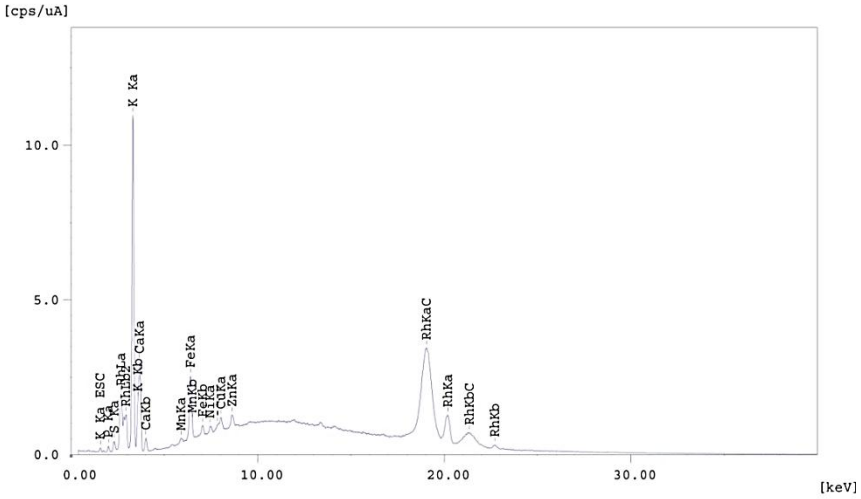

Figure 4. EDXRF Spectrum of leaves of *T.erecta*

Table 3. Relative Abundance of Elements in *T.erecta*of Flowers and Leaves by EDXRF Spectrometer

No	Element	Relative abundance(%)	
		Flowers	**Leaves**
1.	K	49.173	61.865
2.	Ca	30.155	25.735
3.	Si	9.577	2.115
4.	Fe	5.008	3.216
5.	S	1.980	2.533
6.	P	1.930	3.036
7.	Mn	0.510	0.344
8.	Ti	0.504	-
9.	Zn	0.239	0.393
10.	Cr	0.194	-
11.	Cu	0.175	0.480
12.	Rb	0.167	-
13.	Br	0.149	-
14.	Sr	0.117	-

Table 4. Mortality Percentage of Rice Weevil Treated with Plant Extracts of Leaves a of *Tagetes erecta* L. by disc method

Extracts	Conc.(ppm)	No. of Insects	No. of Dead	Mortality (%) Flowers
Ethanol	500	10	8	80
	300	10	7	70
	150	10	6	60
Methanol	500	10	8	80
	300	10	7	70
	150	10	6	60
Petroleum ether	500	10	9	90
	300	10	8	80
	150	10	7	70
Ethyl Acetate	500	10	10	100
	300	10	9	90
	150	10	8	80
Control	-	10	-	-

Table 5. Mortality Percentage of Rice Weevil Treated with Plant Extracts of flowers of *Tagetes erecta* L.by disc method

Extracts	Conc.(ppm)	No. of Insects	No. of Dead	Mortality (%) Flowers
Ethanol	500	10	7	70
	300	10	6	60
	150	10	5	50
Methanol	500	10	7	70
	300	10	6	60
	150	10	5	50
Petroleum ether	500	10	8	80
	300	10	7	70
	150	10	6	60
Ethyl Acetate	500	10	9	90
	300	10	8	80
	150	10	7	70
Control	-	10	-	-

Conclusion

From this study on leaves and flowers of *T.erecta* L. the following interence can be concluded. The prelimary phytochemical tests revealed that the alkaloids, α-amino acids, carbohydrates, flavonoids, glycosides, phenolic compounds, saponins, reducing sugars, tannins, steriods and terpenoids were present in *T.erecta* but starch was absent.

The elemental analysis determined by EDXRF method indicated that the highest abundance percentage of K (61.865 %) of leaves and (49.173 %) of flowers.

Nutritional values of flowers and leaves were determined by AOAC method indicating that the moisture content (8 %, 8.59 %), ash (4.48 %, 15.92 %), protein (12.57 %, 16.13 %), fiber (2.04 % , 4.54 %), fat (4.03 %, 12.25 %) and carbohydrate (41.29 %, 26.92 %). The energy value of flowers and leaves of*T.erecta* is (251.71 kcal, 281.61kcal/100g).

The pesticidal activity of flowers and leaves of *T.erecta*wasdetermined by petri-dish method. In pesticidal activity, ethyl acetate extracts of both leaves and flowers of *T.erecta* are more effective than other extracts in rice weevils . The present work reveals that *T.erecta* leaves and flowers can be used for the treatment of diseases and chemicalpesticides.

This study shows that extracts of leaves and flower of *T.erecta* and its having the pesticidal activity on rice weevils. These extracts can be used to replace chemical pesticide .It is used as an alternative method, improving efficiency in pest control, reducing economic losses and enabling greater sustainability to the agriultural system. *T.erecta*hasinsecticidal activity against pests of stored products.

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