

## Studies on Antioxidant Properties of *Jasminum* species by FRAP Assay

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### ABSTRACT

*Plants have been used in traditional medicines for treatment of different ailments from ancient times. Medicinal plants have been one of the richest bio resources for traditional and folk medicines till date. In India, around 20,000 medicinal plants have been recorded however traditional communities are currently using only about 7,000 - 7,500 plants for curing different diseases. The medicinal property of different varieties of Jasminum namely Jasminum grandiflorum (Jajji Mallige), Jasminum sambac cultivar variety (yelu sutina mallige), Jasminum aungustifolium, Jasminum sambac wild variety (Gundu Mallige), Jasminum sambac cultivar variety (suji mallige), Jasminum auriculatum, Jasminum humile (Yellow Jasmine) and Jasminum officinale (Sanna jajji mallige) was studied in the present investigation and the medicinal property of the plant was checked by determining the antioxidant property of methanolic and ethanolic solvent extract from the leaves. The antioxidant property was checked by FRAP assay and it was found that all the samples had higher antioxidant activity when compared to the standard. The antioxidant activity was not much varied with methanol or ethanol solvent as both are polar in nature. The antioxidant activity in all the samples increased with the increase in the concentration of the sample. Jasminum aungustifolium, Jasminum humile and Jasminum officinale showed higher antioxidant activity when compared to other solvent extracted samples. The least antioxidant activity was seen by Jasminum grandiflorum and Jasminum sambac cultivar variety.*

**Keywords:** FRAP, Antioxidant, Methanol, Ethanol, Jasmine species.

### INTRODUCTION

The antioxidant and antimicrobial potential of plants have attracted the attention of scientific community from ancient times. The antioxidants have been useful in retarding oxidative deterioration of food materials especially those with high lipid contents<sup>1</sup> and also have showed that they have the capacity to protect the living cells from oxidative damage that occur due to formation of free radicals and reactive oxygen species during most of the metabolic activity. The oxidative damage of cellular constituents in the human body leads to cell injury that may lead to cell death that is associated with pathogenesis of various chronic diseases like carcinomas, coronary heart disease and many other health problems related to advance age<sup>2</sup>. This has lead to increase in the interest of natural substances exhibiting antimicrobial and antioxidant properties that are supplied to human and animal as food components or as specific pharmaceuticals<sup>3</sup>. Among the living sources plants are the primary sources of naturally occurring antioxidants for humans. It has been well known that the essential oils and plant extracts have antimicrobial and antioxidant effects<sup>4</sup>.

Plants are potent biochemical factories and have been components of phytochemistry since times immemorial throughout the world.

Plant based natural constituents have been derived from all the part of plant like bark, leaves, flowers, roots, fruits, seeds, etc. and most of the part of the plant contains active components. The beneficial medicinal effects of plant materials typically is due to the combinations of phytochemical compounds present in the plant and their action is unique to particular plant species or groups.

*Jasminum sambac*. Linn (Oleaceae) is commonly known as Jasmine. It is a well known glabrous twining shrub widely grown in gardens throughout India. It contains around 200 species native to tropical and warm temperate regions of the Eurasia and other parts of the world. The flower is acrid and bitter in taste. It is useful in treating diseases of the mouth and teeth, especially for toothache<sup>5</sup>. The *J. sambac* flowers and leaves are largely used in folk medicine to prevent and treat breast cancer. Flowers of *J. sambac* are useful to women when brewed as a tonic as it aids in preventing breast cancer and stopping uterine bleeding<sup>6</sup>. It is widely used in the Ayurveda, as an anti ulcerative, anti cancer, anti leprotic, skin diseases and wound healing.

*Jasminum angustifolium* Linn is been used alone or in combination with other medicinal plants by the traditional systems of Siddha and Ayurvedic medicine for the treatment of various diseases. It was found from the tribes of south India that the plant has been used for the suppression of tumour like syndrome among their own population<sup>7</sup>. However, hepatoprotective<sup>8</sup> and antitumor activity has been reported against Dalton's Ascitic Lymphoma<sup>7</sup> using ethanol and aqueous extracts.

*Jasminum grandiflorum* belongs to the family Oleaceae. Although cultivated in subtropical and warm temperate regions for its ornamental qualities, *Jasminum grandiflorum* is valued as a medicinal plant as it is effective against number of ailments. The roots, leaves and flowers of the plant is useful in paralysis, mental debility, chronic constipation, flatulence, sterility, ringworm, leprosy and skin diseases<sup>9</sup>. In fixing loose teeth, leprosy, skin diseases, dysmenorrhoea, ulcers, wounds and corns<sup>10</sup> in conditions of leprosy, skin diseases, pruitus, ulcers, dysmenorrhoea and vitiated conditions of pitta<sup>11</sup>. The whole flowers of *J. grandiflorum* are used in treatment of wound healing in folk medicine.

*Jasminum grandiflorum* Linn. Is native to Himalayas and wildy grows throughout India and Bangladesh. Whole plant, root, leaves and flowers of the plant are used in Ayurvedic preparations. *J. grandiflorum* is good for treatment of chronic ulcers or eruptions in mouth (leaves are chewed) as well as for skin diseases and poisoning<sup>12</sup>.

Bioactive compounds commonly found in fruits, vegetables, herbs, and other plants have been shown to have possible health benefits with antioxidative, anticarcinogenic, atherosclerosis, antimutagenic, and angiogenesis inhibitory activities<sup>13, 14, 15</sup>. Interestingly, many herbs are known to contain large amounts of phenolic antioxidants other than well-known vitamin C, vitamin E, and carotenoids.

## MATERIALS AND METHODOLOGY

### Sample Collection

The samples for the present investigation were collected from different places in and around Bangalore from Nurseries, GKVK and FRLHT. These plant samples were collected fresh and were brought to the lab for further investigations. The different varieties of *Jasminum* selected for the present study are *Jasminum grandiflorum* (Jajji Mallige), *Jasminum sambac* cultivar variety (yelu suddina mallige), *Jasminum angustifolium*, *Jasminum sambac* wild variety (Gundu Mallige), *Jasminum sambac* cultivar variety (suji mallige), *Jasminum auriculatum*, *Jasminum humile* (Yellow Jasmine) and *Jasminum officinale* (Sanna jajji mallige).

### Solvent Extract

The leaf samples belonging to the Genus *Jasminum* were dried at 40°C and then the dried samples were ground into fine powder using a blender. 100gms of the powder was dissolved in 500ml of solvents like Methanol and Ethanol in Soxhlet apparatus and subjected for extraction. The distillation was carried out for individual samples separately with the solvents and the filtrate was collected and it was concentrated by evaporating the solvent to get a final stock. These crude samples were used for studying the antioxidant properties of the samples.

## Antioxidant activity

### FRAP Assay:

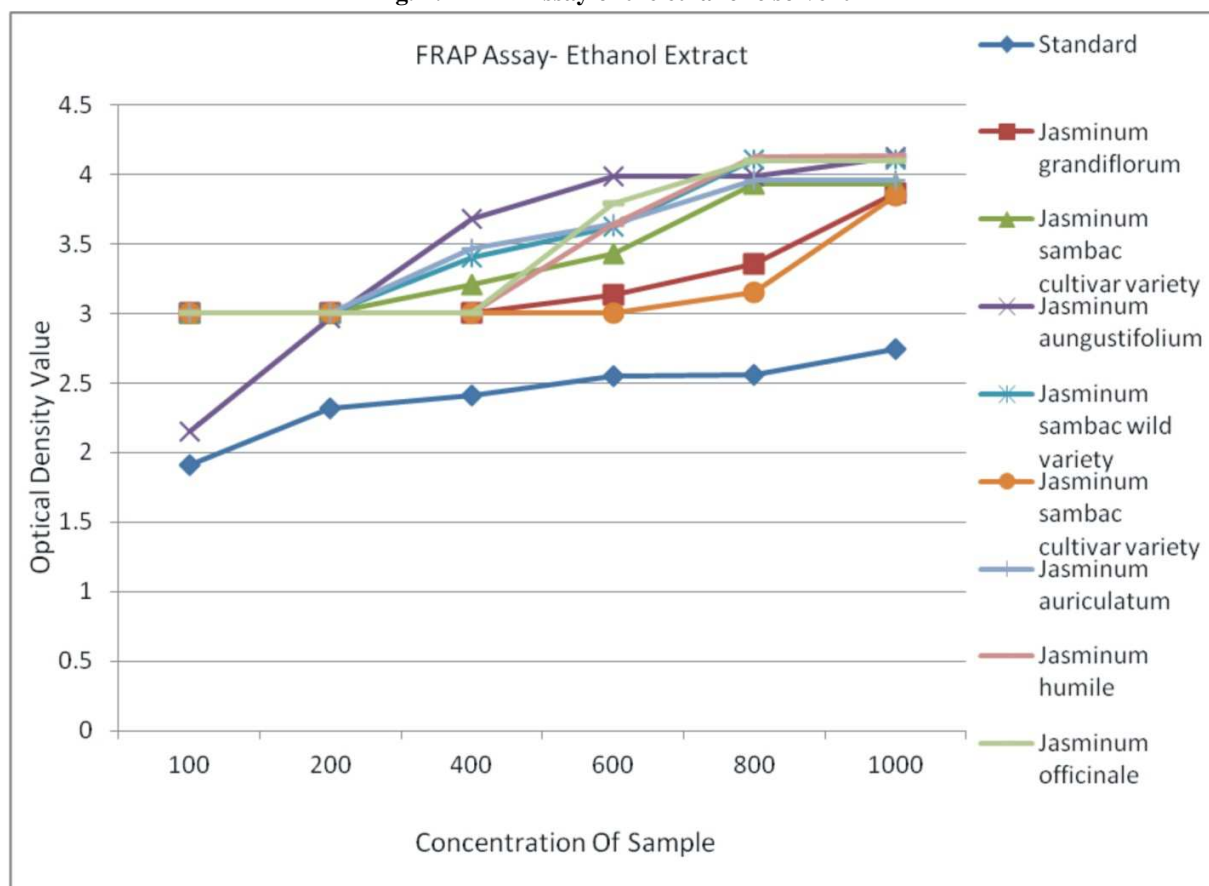
In order to assess the modifying effect of tea flavonoids on plasma antioxidant status, a variety of methods has been employed. Commonly used is the FRAP assay. This is a colorimetric assay that measures the ability of plasma to reduce the intense blue ferric tripyridyltriazine complex to its ferrous form, thereby changing its absorbance<sup>16</sup>.

FRAP assay was performed according to the methods of<sup>17</sup> with slightly modification. An amount of 200  $\mu$ l extracted samples were mixed with 3 ml FRAP reagent in test tubes and vortexed. Blank samples were prepared for both methanol and deionized water extracted samples. Both samples and blank were incubated in water bath for 30 minutes at 37°C and the absorbance of the samples was determined against blank at 593 nm. Series of stock solution of 200, 400, 800, 1200 and 1600  $\mu$ M were prepared ( $r^2= 0.9944$ ) using aqueous solution of  $FeSO_4 \cdot 7H_2O$  as standard curve<sup>18</sup>.

## RESULTS

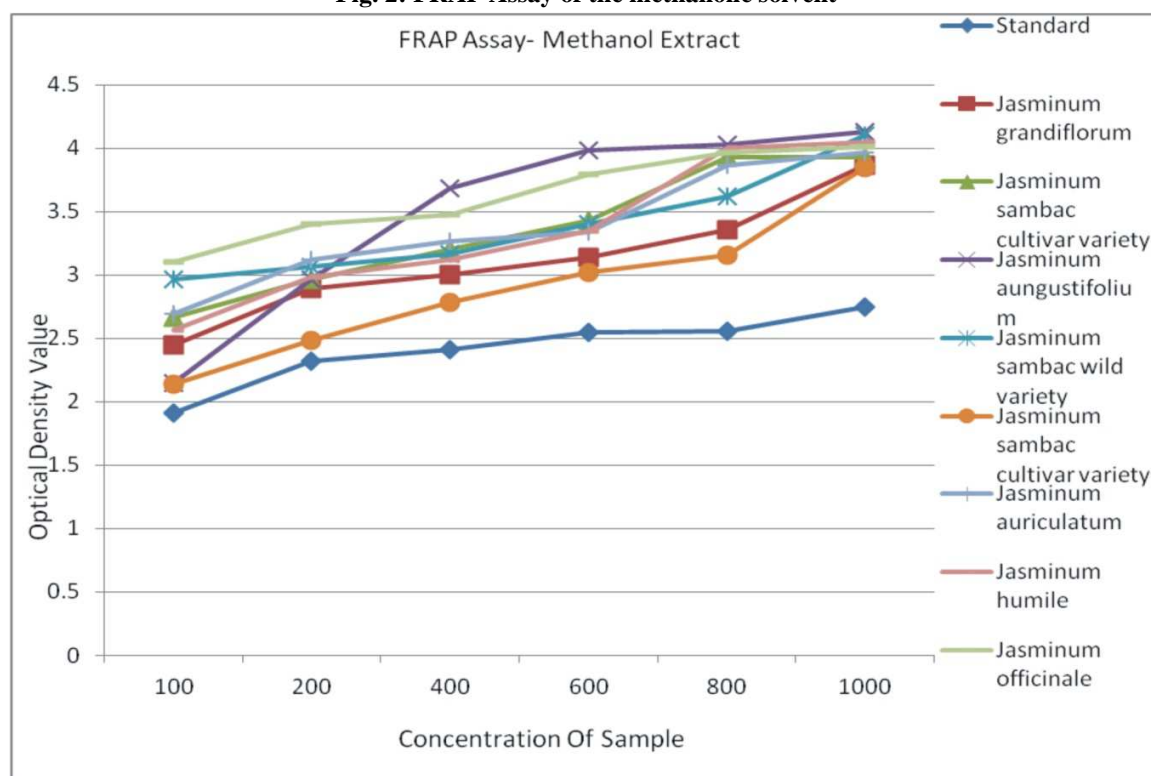
FRAP Assay was carried out to check reduction in the ferric compounds and all the methanolic extract showed similar kind of reduction. All the samples showed higher activity than the standard suggesting that they had a higher potential of antioxidant property. The ethanolic extract of *Jasminum angustifolium*, *Jasminum humile* and *Jasminum officinale* showed higher antioxidant activity when compared to other ethanolic solvent extracted samples. The least antioxidant activity was seen by *Jasminum grandiflorum* and *Jasminum sambac cultivar variety* (Figure 1). *Jasminum grandiflorum*, *Jasminum sambac cultivar variety*, *Jasminum sambac cultivar variety* and *Jasminum humile* gradually showed no difference in the antioxidant activity up to 400 $\mu$ l of the sample and then increased with increase in the concentration.

Fig. 1: FRAP Assay of the ethanolic solvent



FRAP Assay was carried out to check reduction in the ferric compounds and all the ethanolic extract showed similar kind of reduction. All the samples showed higher activity than the standard suggesting that they had a higher potential of antioxidant property. *Jasminum aungustifolium*, *Jasminum sambac wild variety* showed the maximum antioxidant activity with optical density value above 4.0. all the samples in all the concentrations showed higher antioxidant capacity when compared to the standard ascorbic acid. The least antioxidant activity was seen by *Jasminum grandiflorum* and *Jasminum sambac cultivar variety* with methanolic solvent (Figure 2).

**Fig. 2: FRAP Assay of the methanolic solvent**



## DISCUSSION

The phytochemical screening and anti-lipid peroxidation effect of *J. sambac* was carried out by Kalaiselvi M *et al.*<sup>19</sup> and the results showed that there was presence of alkaloids, flavonoids, terpenoids, carbohydrates, proteins, phenols, tannins, saponins and phytosterols. The methanolic extract of the *J.sambac* flowers showed anti-lipid per oxidative effect which was found to be similar to that of all standards used.

Literature study showed that essential oil and methanol extract from *Jasminum sambac* have Invitro antimicrobial and antioxidant activities which could support the use of the plant by traditional healers to treat various infective diseases<sup>1</sup>. Another study shows that Jasmine flowers, applied to the breasts showed suppression of puerperal lactation comparable to Bromocriptine, with significant reduction of serum prolactin (greater than bromocriptine) and Jasmine flowers seem to be an effective and inexpensive method of suppressing puerperal lactation and can be used as an alternative in situations where cost and non availability restrict the use of bromocriptine<sup>20</sup>. On the other hand, studies on chemical constituents in roots of *Jasminum sambac* shows that it contains dotriacontanoic acid, dotriacontanol, oleanolic acid, daucosterol and hesperidin<sup>21</sup>.

Raja Sekharan *et al.*<sup>22</sup> studied the detailed pharmacognostical evaluation of the leaves of *Jasminum grandiflorum linn* and found that the ethanol, acetone solvent extract showed presence of some phytochemical compounds whereas benzene solvent extracted sample did not show presence of any compounds.

Prasad M.P *et al.*<sup>18</sup> investigated for phytochemical compounds and antioxidant property of three *Cestrum* species using different solvents such as ethanol, methanol, butanol, propanol and acetone by DPPH and FRAP assay which showed high content of antioxidant compounds indicating the use of these plants for medicinal purposes.

Sravani Ch *et al.*<sup>23</sup> investigated preliminary phytochemical tests and various *in vitro* antioxidant and free radical scavenging activities like DPPH, ABTS, superoxide anion scavenging and reducing power activity of *Nyctanthes arbor-tristis* Linn (NAT) flower and they found that the flower showed the presence of phytochemicals like Sterols, triterpenes, saponins, alkaloids, carbohydrates, reducing sugars, tannins, flavonoids and cardiac glycosides and moderately scavenged ABTS radical with the IC<sub>50</sub> of 406.69±0.10, ascorbic acid was used as a reference standard that showed scavenging activity with an IC<sub>50</sub> value of 21.88±0.55µg/ml.

Krishnaveni. A *et al.*<sup>24</sup> investigated the antioxidant potential of hydro alcoholic extract of leaves by various *in vitro* methods and found that *Jasminum sambac* showed moderate scavenging effect in the order towards the DPPH radicals (122 µg/mL), nitric oxide (173.94 µg/mL) and hydrogen peroxide (125µg/mL) when compared to ascorbic acid. The results indicate that the total antioxidant capacity (155.40 µg/mL) and its reducing power activity (44.28 µg/mL) of the crude extract of *Jasminum sambac* are slightly higher than that of ascorbic acid. Our findings is similar to the study and it was found that the antioxidant property was higher than the standard when determined by FRAP assay.

<sup>12</sup> screened for cytotoxicity and antibacterial activity as well as for some important phytochemical groups from Ethanol extracts of the traditionally valuable plant *Jasminum grandiflorum* L and found that Highest zone of inhibition produced by *J.grandiflorum* was found to be against *Proteus vulgaris* with a zone size of 15mm in diameter.

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