



ISSN NO. 2320-5407

Journal homepage: <http://www.journalijar.com>  
Journal DOI: [10.21474/IJAR01](https://doi.org/10.21474/IJAR01)

INTERNATIONAL JOURNAL  
OF ADVANCED RESEARCH

## RESEARCH ARTICLE

**Study in phytochemical composition biological active substances (antioxidant)  
some species of sage brush (Artemisia L).**

\*Gerelmaa Adiya<sup>1</sup>, Ariunaa Jugder<sup>2</sup>, Tserennadmid Byambasuren<sup>3</sup>.

1. Department of General Education, Mongolian National University of Medical Sciences, Mongolia.
2. Department of Biology and Histology, Mongolian National University of Medical Sciences, Mongolia.
3. Department of Anatomy, Mongolian National University of Medical Sciences, Mongolia.

**Manuscript Info****Manuscript History:**

Received: 12 February 2016  
Final Accepted: 25 March 2016  
Published Online: April 2016

**Key words:**

Sage brush,  
Substance,  
Pharmacological

**\*Corresponding Author**

Gerelmaa Adiya.

**Abstract**

There are 109 sorts of Artemisia L in Mongolia, which are growing in Khubsgul, Khentii, Khangai, in Altai mountain chain, so that mostly covering the whole country. Artemisia L was widely used in Mongolian traditional medicine and also in Tibetan medicine. Even if was used in traditional medicine, for Mongolia till present days it wasn't studied completely in terms of chemical composition and its pharmacological influence, therefore it was decided for research work due to its easy spreadance and based on its uncertain use as the raw material for pharmacology. The main aim of research is to define the content of main agent, which shows phytochemical and to determine the phytochemical approach of pharmacological raw materials. From our investigations we attained the following conclusions: Determinedashing macro-micro elements of 12 sage brush species above section, In result of Phytochemical investigation contents of flavonoid Artemisamacrocephala 1.2%, Alcoloid Artemisia Viridis-1.676 %, SaponinArtemisia gmelinii-0.156 %, Coumarin Artemisia Abtuslioba-0.0904% for 12 sage brush species. Their contents had very higher, Byspectrophotochemistry for 3 substance with wavelenght 370 nm, there were light sorption, which proved the flavonoid content.

Copy Right, IJAR, 2016., All rights reserved.

**Introduction:-**

There are 109 sorts of Artemisia L in Mongolia, which are growing in Khubsgul, Khentii, Khangai, in Altai mountain chain, so that mostly covering the whole country. Artemisia L was widely used in Mongolian traditional medicine and also in Tibetan medicine. Even if was used in traditional medicine, for Mongolia till present days it wasn't studied completely in terms of chemical composition and its pharmacological influence, therefore it was decided for research work due to its easy spreadance and based on its uncertain use as the raw material for pharmacology.

**Material and Methods:-**

The simples were 12 sorts of sage brush /Ar / location of collected samples and its time periods are shown in Table-1. The qualitative analysis, quantitative analysis, X-ray fleonescentic method, chromatographic methods were used in the study.

Table -1

| №  | Name                     | Location                                      | Date      |
|----|--------------------------|---|-----------|
| 1  | <i>A. dracunculus.L</i>  | Arkhangaiimag , Tsahir sum                    | 2006.8.1  |
| 2  | <i>A. mongolica.L</i>    | Arkhangaiimag , Tsahir sum                    | 2006.8.1  |
| 3  | <i>A. gmelinii.L</i>     | On the way from Ulaanbaatar KharKhorin 397 km | 2006.7.29 |
| 4  | <i>A. glauca.L</i>       | Arkhangai, Tsetserleg 72km                    | 2006.7.30 |
| 5  | <i>A. abtusiloba.L</i>   | Zavkhan, Otgon sum                            | 2006.8.4  |
| 6  | <i>A. adamsa.L</i>       | Tuvaimag, Lun sum                             | 2006.7.27 |
| 7  | <i>A. viridis.L</i>      | Zavkhanaimag, Tselmen                         | 2006.8.2  |
| 8  | <i>A. pectinata.L</i>    | Tuvaimag, Lun sum                             | 2006.7.27 |
| 9  | <i>A. methifolia.L</i>   | Taragt – MandalGobi 6km                       | 2006.8.27 |
| 10 | <i>A. scopiara.L</i>     | Tuvaimag, Lun sum                             | 2006.7.28 |
| 11 | <i>A. frigida.L</i>      | Tuv-UB 97km                                   | 2006.7.27 |
| 12 | <i>A. macrocephala.L</i> | Tuvaimag , Lun sum                            | 2006.7.27 |

## Result and Discussion:-

### Result of of qualitative analysis:-

Determination of flavonoids, alcaloids, saponins, coumarins in 12 sorts of sage brush by table2

| No | Name                         | Flavonoid | Alcaloid | Saponin | Coumarin |
|----|------------------------------|-----------|----------|---------|----------|
| 1  | <i>Artemisiadracunculus</i>  | +         | +        | +       | +        |
| 2  | <i>Artemisiamongolia</i>     | +         | +        | +       | +        |
| 3  | <i>Artemisiagmelinii</i>     | +         | +        | +       | +        |
| 4  | <i>Artemisia glauca</i>      | +         | +        | +       | +        |
| 5  | <i>ArtemisiaAbtusiloba</i>   | +         | +        | +       | +        |
| 6  | <i>Artemisia adamsa</i>      | +         | +        | +       | +        |
| 7  | <i>Artemisia viridis</i>     | +         | +        | +       | +        |
| 8  | <i>Artemisia pectinata</i>   | +         | +        | +       | +        |
| 9  | <i>Artemisiamethifolia</i>   | +         | +        | +       | +        |
| 10 | <i>Artemisia scopiara</i>    | +         | +        | +       | +        |
| 11 | <i>Artemisia frigida</i>     | +         | +        | +       | +        |
| 12 | <i>Artemisiamacrocephala</i> | +         | +        | +       | +        |

### Result of quantitative analysis:-

Determination of flavonoids, alcaloids, suponins, coumarins, ashing and moisture by quantitative analysis table-3,4.

Table-3

| №       | 1                     | 2                  | 3                  | 4                | 5                    | 6                | 7                 | 8                   | 9                    | 10                 | 11                | 12                     |
|---------|-----------------------|--------------------|--------------------|------------------|----------------------|------------------|-------------------|---------------------|----------------------|--------------------|-------------------|------------------------|
| Name    | <i>A. dracunculus</i> | <i>A. mongolia</i> | <i>A. gmelinii</i> | <i>A. glauca</i> | <i>A. Abtusiloba</i> | <i>A. adamsa</i> | <i>A. viridis</i> | <i>A. pectinata</i> | <i>A. methifolia</i> | <i>A. scopiara</i> | <i>A. frigida</i> | <i>A. macrocephala</i> |
| Ash (%) | 10.9                  | 9.8                | 15.3               | 8.3              | 9.4                  |                  | 6.9               | 11.9                |                      |                    | 5.8               | 12.3                   |
| Ash (%) | 6.5                   | 7.3                | 6.2                | 6.25             | 5.45                 | 5.65             | 6.25              | 5.9                 | 6.05                 | 5.95               | 6.45              | 4.9                    |

Table-4

| No | Name                         | Flavonoid (%) | Alcaloid (%) | Suaponin (%) | Coumarin(%) |
|----|------------------------------|---------------|--------------|--------------|-------------|
| 1  | <i>Artemisiadracunculus</i>  | 0.09%         | 0.77%        | 0.1%         | 0.02%       |
| 2  | <i>Artemisiamongolia</i>     | 0.49%         | 0.86%        | 0.05%        | 0.04%       |
| 3  | <i>Artemisiagmelinii</i>     | 0.07%         | 0.89%        | 0.15%        | 0.02%       |
| 4  | <i>Artemisia glauca</i>      | 0.47%         | 0.91%        | 0.05%        | 0.02%       |
| 5  | <i>ArtemisiaAbtusiloba</i>   | 0.10%         | 1.54%        | 0.05%        | 0.09%       |
| 6  | <i>Artemisia adamsa</i>      |               |              |              |             |
| 7  | <i>Artemisia viridis</i>     | 0.80%         | 1.67%        | 0.07%        | 0.03%       |
| 8  | <i>Artemisia pectinata</i>   | 0.85%         | 1.41%        | 0.06%        | 0.01%       |
| 9  | <i>Artemisiamethifolia</i>   |               |              |              |             |
| 10 | <i>Artemisia scopiara</i>    |               |              |              |             |
| 11 | <i>Artemisia frigida</i>     | 0.11%         | 0.92%        |              | 0.03%       |
| 12 | <i>Artemisiamacrocephala</i> | 1.2%          | 1.61%        | 0.05%        | 0.05%       |

From Table-4 we see that in

*Artemisiamacrocephala*-flavonoid

*Artemisia viridis*-alcaloid

*Artemisiagmelinii*-saponin

*ArtemisiaAbtusiloba*-coumarin were discovered in great amount: Due to less amount of samples *Artemisia adamsa*, *Artemisiamethifolia*, *Artemisia scopiara* quantitative analysis were not carried out.

#### **Result of macro –micro elements by X-ray fluorescence method:-**

There were determined Al, V, Cr, Fe, Co, Ni, Cu, Zn, Sr, Mo, Cd, Sb, Br, Pb totally 14 elements in 10 sorts of sage brush samples.

Table-5

| №  | Sample name                  | Mass of sample (gr) | Elements mg/kg or ppm |        |       |          |        |       |        |
|----|------------------------------|---------------------|-----------------------|--------|-------|----------|--------|-------|--------|
|    |                              |                     | Al                    | V      | Cr    | Fe       | Co     | Ni    | Cu     |
| 1  | <i>Artemisia dracunculus</i> | 1,0000              | Al                    | V      | Cr    | Fe       | Co     | Ni    | Cu     |
|    |                              |                     | 11701.2               | -      | 20.40 | 5071.72  | 2.83   | 17.71 | 151.32 |
|    |                              |                     | Zn                    | Sr     | Mo    | Cd       | Sb     | Ba    | Pb     |
|    |                              |                     | 718.82                | 109.99 | -     | 1.92     | -      | -     | 22.38  |
| 2  | <i>Artemisia mongolia</i>    | 1,0000              | Al                    | V      | Cr    | Fe       | Co     | Ni    | Cu     |
|    |                              |                     | 0.000                 | -      | 0.799 | 5658.85  | 3.69   | 22.48 | 0.41   |
|    |                              |                     | Zn                    | Sr     | Mo    | Cd       | Sb     | Ba    | Pb     |
|    |                              |                     | 732.69                | <0.005 | -     | 2.32     | -      | -     | 16.16  |
| 3  | <i>Artemisia gmelinii</i>    | 1,0000              | Al                    | V      | Cr    | Fe       | Co     | Ni    | Cu     |
|    |                              |                     | 11511.35              | -      | 46.47 | 17686.87 | 8.84   | 28.49 | 158.84 |
|    |                              |                     | Zn                    | Sr     | Mo    | Cd       | Sb     | Ba    | Pb     |
|    |                              |                     | 138.66                | 110.15 | -     | 4.56     | -      | -     | <0.05  |
| 4  | <i>Artemisia glauca</i>      | 1,0000              | Al                    | V      | Cr    | Fe       | Co     | Ni    | Cu     |
|    |                              |                     | 11641.1               | -      | 30.22 | 7281.6   | 3.29   | 28.55 | 158.64 |
|    |                              |                     | Zn                    | Sr     | Mo    | Cd       | Sb     | Ba    | Pb     |
|    |                              |                     | 275.08                | 106.71 | -     | 2.32     | -      | -     | <0.05  |
| 5  | <i>Artemisia Abtusiloba</i>  | 1,0000              | Al                    | V      | Cr    | Fe       | Co     | Ni    | Cu     |
|    |                              |                     | -                     | 19.94  | 36.69 | 16363.02 | 6.42   | 26.34 | 144.09 |
|    |                              |                     | Zn                    | Sr     | Mo    | Cd       | Sb     | Ba    | Pb     |
|    |                              |                     | 272.16                | -      | 6.16  | 5.26     | -      | -     | 15.91  |
| 6  | <i>Artemisia adamsa</i>      | 1,0000              | Al                    | V      | Cr    | Fe       | Co     | Ni    | Cu     |
|    |                              |                     | -                     | 0.07   | 0.31  | <0.020   | 0.48   | 0.60  | 0.54   |
|    |                              |                     | Zn                    | Sr     | Mo    | Cd       | Sb     | Ba    | Pb     |
|    |                              |                     | 0.31                  | -      | 0.13  | 0.38     | -      | -     | <0.05  |
| 7  | <i>Artemisia viridis</i>     | 1,0000              | Al                    | V      | Cr    | Fe       | Co     | Ni    | Cu     |
|    |                              |                     | -                     | 3.21   | 12.75 | -        | <0.010 | 10.19 | 68.02  |
|    |                              |                     | Zn                    | Sr     | Mo    | Cd       | Sb     | Ba    | Pb     |
|    |                              |                     | 302.67                | -      | 5.33  | <0.005   | -      | -     | 2.63   |
| 8  | <i>Artemisia pectinata</i>   | 1,0000              | Al                    | V      | Cr    | Fe       | Co     | Ni    | Cu     |
|    |                              |                     | -                     | 9.60   | 13.05 | -        | 0.56   | 11.11 | 49.40  |
|    |                              |                     | Zn                    | Sr     | Mo    | Cd       | Sb     | Ba    | Pb     |
|    |                              |                     | 572.32                | -      | <0.03 | <0.005   | -      | -     | 8.55   |
| 9  | <i>Artemisia methifolia</i>  | 1,0000              | Al                    | V      | Cr    | Fe       | Co     | Ni    | Cu     |
|    |                              |                     | -                     | 2.75   | 13.49 | -        | <0.01  | 22.19 | 43.68  |
|    |                              |                     | Zn                    | Sr     | Mo    | Cd       | Sb     | Ba    | Pb     |
|    |                              |                     | 172.92                | -      | 12.54 | <0.005   | -      | -     | 2.37   |
| 10 | <i>Artemisia frigida</i>     | 0.9472              | Al                    | V      | Cr    | Fe       | Co     | Ni    | Cu     |
|    |                              |                     | -                     | 10.51  | 16.50 | -        | <0.01  | 9.59  | 51.96  |
|    |                              |                     | Zn                    | Sr     | Mo    | Cd       | Sb     | Ba    | Pb     |
|    |                              |                     | 105.93                | -      | <0.03 | <0.005   | -      | -     | 1.97   |

(-) undetected a particular element.

### Result of determination of antibacterial activity

Determination of 12 sorts of sage brush in alcohol extract from soil surface using 4 bacterias; E. Coli, Strph, Aureus, Entoarousantibactetial activity by paper disc method. Picture-5 Table-6

Picture-5



Table-6

| Nº | Name                          | E.Coli | Staph.Aureus | Enterococustaec<br>alis | Bac.Subtilis |
|----|-------------------------------|--------|--------------|-------------------------|--------------|
| 1  | <i>Artemisia dracunculus</i>  | +      | -            | -                       | +            |
| 2  | <i>Artemisia mongolia</i>     | +      | ++           | +                       | +            |
| 3  | <i>Artemisia gmelinii</i>     | ++     | +            | +                       | +            |
| 4  | <i>Artemisia glauca</i>       | +      | -            | +                       | -            |
| 5  | <i>Artemisia Abtusiloba</i>   | -      | +            | -                       | -            |
| 6  | <i>Artemisia adamsa</i>       | ++     | +            | +                       | ++           |
| 7  | <i>Artemisia viridis</i>      | -      | +            | -                       | -            |
| 8  | <i>Artemisia pectinata</i>    | -      | -            | -                       | +            |
| 9  | <i>Artemisia methifolia</i>   | -      | ++           | -                       | ++           |
| 10 | <i>Artemisia scopiara</i>     | -      | +            | -                       | +            |
| 11 | <i>Artemisia frigida</i>      | ++     | -            | ++                      | +            |
| 12 | <i>Artemisia macrocephala</i> | ++     | +            | +                       | +            |

(+ 6-10mm) (++) 11-16mm) (+++ 17-25 mm)

### Results of antioxidants (DPPH) by thin film chromatographic method:-

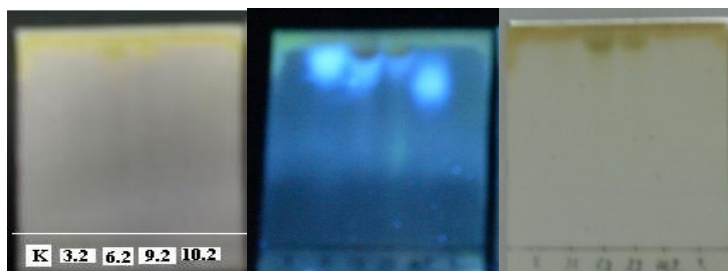
12 sorts of sage brush were placed in alcohol extract by thin film chromatographic method. Due to choose suitable solvent system we used TLC in several solvent systems, and set up comparisons between them.

1. Detector: (10 %; AlCl<sub>3</sub> ethanol solution (D PPM methanol solution), 2 times sprinkled 302 nm, 364nm, investigated in visible light region and compared

We chose vinegar acid : water (60:15:15) as solvent system. There were 12 species in the thin film chromatography, and sprinkled with DPPH methanol solution and watched in visible light region. Samples points, which proved the presence of antioxidant activities in comparison with other samples.

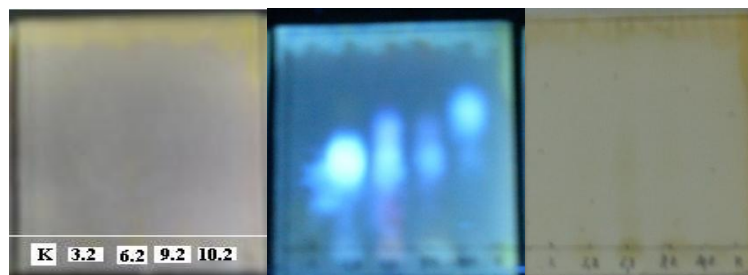
By detecting antioxidant activity 4 species of sage brush in ethanol extract fractions, N-Butanol; vinegar acid : water (60:15:15) by thin film chromatography method the results were 3,2 ( *Artemisia gmelinii*), 6,2 ( *Artemisia adamsa*), 9,2 ( *Artemisia methifolia*), 10,2 ( *Artemisia scopiara*) picture-10

1. N-butanol, vinegar acid : water ;(4:1:5) Detector (10 % AlCl ethanol solution).(DPPN – methanol solution ) 2 sprinckles 364 nm in visible light region were compared. Picture-6

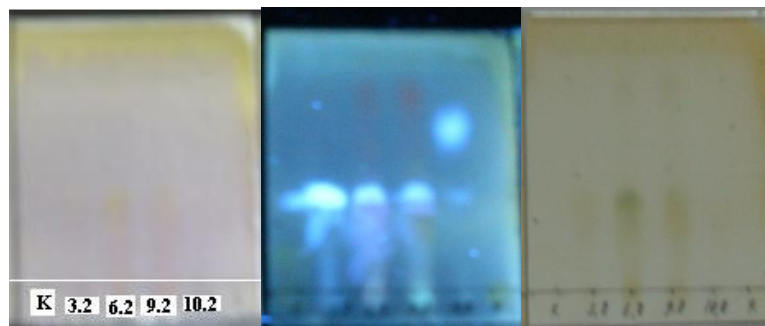


2. Chloroform :Etilacetate (4:6).

Picture-7



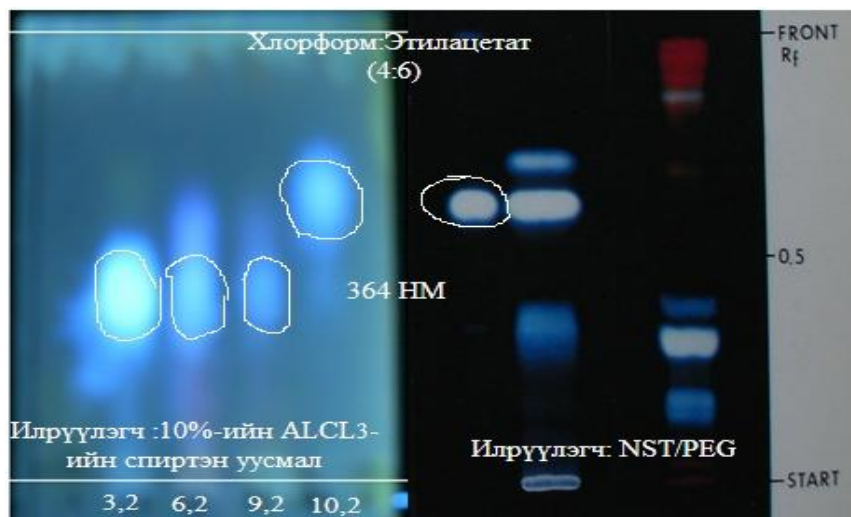
3. Chloroform : Methanol (9:1)Picture-8



We noticed through determination the content of flavonoid by antioxidant activity. 10.2 (*Artemisia scopiara*ethylacetate extract) (3,2) (6,2) (9,2) was different.

For same Rf samples (3,2) (6,2) (9,2) used column chromatography.

Picture-9



**Results of column chromatography method**

Picture-10

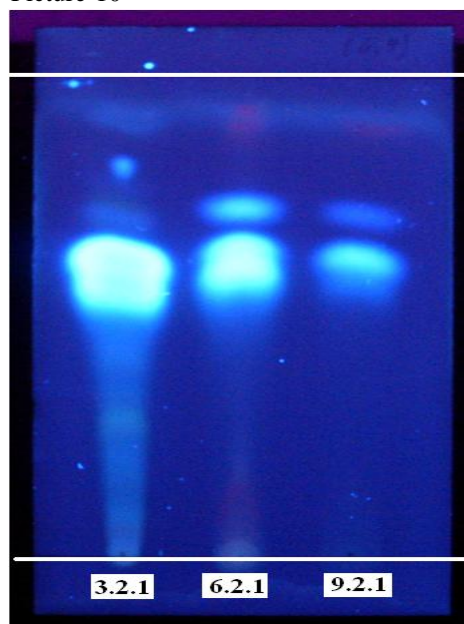


Table-7

| Name  | Rf1 | Rf2 |
|-------|-----|-----|
| 3.2.1 | 0.6 | -   |
| 6.2.1 | 0.6 | 0.4 |
| 9.2.1 | 0.6 | 0.4 |

From our investigations we attained the following conclusions

- Determined ashing macro-micro elements of 12 sage brush species above section
- In result of Phytochemical investigation contents of flavonoid *Artemisamacrocephala* 1.2%, Alcoloid *Artemisia Viridis*-1.676 %, Saponin *Artemisia gmelinii*-0.156 %, Coumarin *Artemisia Abtuslioba*-0.0904% for 12 sage brush species. Their contents had very higher.
- When we saw 12 sage brush species activity *Artemisia adamsa*, *Artemisia gmelinii*, *Artemisia methifolia* had more antioxidant effect
- By using column chromatography in sample *Artemisia gmelinii*, *Artemisia adamsa*, *Artemisia methifolia* there was detected blue colour with same Rf-0.6 solution.
- By HPLC measurement *Artemisiagmelinii*, *Artemisia adamsa*, *Artemisia methifolia* There appeared light sorption.
- By spectrophotometry for 3 substance with wavelength 370 nm, there were light sorption, which proved the flavonoid content.

**References:-**

1. **H. Wagner S. Bladt E. M. Zgainski.** (1983). *Drogenanalyse*. Springer verlag Berlin Heidelberg. New York. (Ed) 163-193
2. **A. I. Rybachenko, B. A. Krivut and V. P. Georgievskii.** (1976). Fluorodensitometric determination of Mangiferin and Isomangiferin. *J. Nat. Prod.* 12(4): 395-396
3. **S. V. Rusakova and S. I. Kocherga.** (1977). Photocolorimetric determination of mangiferin. *Pharm. Chem.* 11: 723-724
4. **Yi Liu a, Yu-Ying Zhao a, Guang-Zhong Tub, Hu-Biao Chen a.** (2005). Flavonoids of the roots of *Hedysarum Kirghisorum*. *Biochemical Systematics and Ecology* 33:809-812
5. **Thomas M. Ehrman, David J. Barlow, and J. Hylands.** (2007) *Phytochemical Databases of Chinese Herbal Constituents and Bioactive Plant Compounds with Known Target Specificities*. *J. Chem. Inf. Model.* 47:254-263
6. **Paolo Manitto, Diego Monti, and Giovanna Speranza.** (2000). Evidence for an NIH Shift as the Origin of the Apparently Anomalous Distribution of Deuterium in Estragole from *Artemisia dracunculus*. *J. Nat. Prod.* 63 (5): 713-715
7. **John A. Beutler, Ernest Hamel, Arnold J. Vlietinck, Achiel Haemers, Padinchare Rajan, James N. Roitman, John H. Cardellina, and Michael R. Boyd.** (1998). Structure-Activity Requirements for Flavone Cytotoxicity and binding to Tubulin. *J. Med. Chem.* 41 (13): 2333-2338
8. **Mitsuru Watanabe.** (1999). Antioxidative Phenolic Compounds from Japanese Barnyard Millet (*Echinochloa utilis*) Grains. *J. Agric. Food Chem.* 47 (11): 4500-4505.