Phytochemical Screening of Selected Vegetables from Akola District

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Abstract -- Wild vegetables play an important role in human life. They areimportant sources of essential vitamins, minerals and trace elements. Some important vegetables contain the antioxidant vitamins A, C, and E which is found to be a reduction in the incidence of cancer, stroke, cardiovascular diseases and other chronic ailments. The present study aimed to identify the phytonutrient and to understand the utilization of these wild vegetables in food.A field study was conducted in Akola District during different seasons and most common vegetables such as Moringa oleifera, Cajanus cajan, Sesbania grandiflora, Hibiscus cannabinus, Crotalaria juncea were found to be consumed by most of the people. Phytochemical results of these plants showed presence of all the important phytochemical to be of great nutritional and medicinal values.

Indexed Terms -- Wild vegetables, importance, phytochemicals.

I. INTRODUCTION

In everyday usage, a vegetable is any part of a plant which is consumed by humans as food, as part of a meal. It normally excludes other food derived from plants such as fruits, nuts, and coral grains, but includes seeds such as pulses (Anwar *et al*., 2007). Originally, vegetables were collected as a wild plant by hunter gatherers and entered cultivation in several parts of the world and a new agricultural way of life developed. At first plants which grew locally would have been cultivated, but as time went on, trade brought exotic crops from elsewhere to add as domestic types (Dhivya and Manimegalal, 2013). Now aday, most of the vegetable are grown all over the world as climate permits, and crops may be cultivated in protected environments in less suitable location16. The scale of production varies from sub resistance farmers supplying the needs of their family for food, to agribusiness with vast acreages of single product crops (Adams and Gianturco, 1956).

Vegetables can be eaten either raw or cooked and play important role in human nutrition, being mostly low in fat and carbohydrate, but high in vitamins, minerals and dietaryfiber (Nuhu *et al*., 2009).In many part, plant consumed as food such as root, tubers, bulls, corns, stem, leaf sheath, leaves buds, fruits and seeds. Vegetables play an important role in human nutrition (El-saidy *et al*., 1992). Most are low in fat and calories but are bulky filling. They supply dietary fiber and are important sources of essential vitamins, minerals and trace elements. Some important vegetables contain the antioxidant vitamins A, C, and E (Lawati *et al*., 2012). When vegetables are included in the diet there is found to be a reduction in the incidence of cancer, stroke, cardiovascular diseases and other chronic ailments. The nutritional contents of vegetables various considerably, some content useful amount of proteins while other contain little fat, and varying properties of vitamin K,vitamin B6, pro-vitamins, dietary minerals and carbohydrates.

Food containing phytochemicals are part of our daily diet (Dahiya *et al*., 1984).Vegetables contain many phytochemicals. Phytochemicals are non-nutritive plant chemicals that have protective or diseases preventive properties (Anwar and Rashid, 2007). They are non-essential nutrients, meaning that they are not required by the human body for sustaining life for (Bhanumati *et al*., 1979). It is well known that plant produce these chemicals to protect themselves but recent research demonstrate that they can also protect human against disease (Dahira *et al*., 2006). There are more than thousand known phytochemicals. Some of the examples are lycopene in tomatoes, isoflavones in say (Al, *et al*., 2005). Most of the phytochemicals have antioxidant activity and protect our cells against oxidative damage and reduce the risk of developing certain types of cancer e.g. Ally sulphides in onions, leeks in garlic, carotenoids in carrots, flavonoids in vegetables, polyphenols in tea; hormonal action such

as isoflavones found in say which initiate human estrogen and help to reduce menopausal symptoms and osteoporosis; stimulation of enzymes such as indoles found in cabbages which stimulates enzymes that make the estrogen less effective and could reduce the risk for breast cancer. (Fojas *et al*., 1982; Burali *et al.*, 2010).

Some of the protease inhibitors in soya and beans are terpenes and saponins found in beans interfere with the replication of cell DNA from carcinogens3. The Alicen which is extracted from garlic has antibacterial properties. Some phytochemicals bind physically to cell walls thereby harvesting the adhesion of pathogeneses to human cell walls while some will reduce the risk of urinary tract, infections improve and dental health. (Javed *et al*., 1999).

Vegetables such as *Moringaolefera, Cajanuscajan, Sesbania grandiflora, Hibiscuscannabins,Crotalaria juncea* are common in Akola region and contains some medicinal properties. Akola is one of the northern most district of Vidarbha regions in Maharashtra. Its total area is about10, 600 sq.kms. There is a considerable variation is the topography, geology and climate. The soil varies from Murrin to light black. The tract shows a considerable variation in climate especially the summer is very hot,maximum temperature reaching to 42^0C and a mean annual rainfall is about 760mm in hilly tracts.

Phytochemicals are naturally present in these vegetables but it is expected that through the bioengineering new plants will be developed, which will contain higher levels. This would make it easier to incorporate enough phytochemicals with our food. Phytochemicals studies of these plants are almost untouched. So, studies of these plants were taken into consideration (Khandelwaldr, 2009).

II. MATERIAL AND METHODS

Collection of plant material- During season following Angiospermic plants were collected from Gaigaon, Patur, Murtijapur, Babulgaon, Borgaon manju region.

1) Flowers of *Crotalaria juncea* (L).Family Fabaceae.- It is commonly known as brown hemp, Indian hemp, Madras hemp or sunn hemp. It is an invasive weed, annual tall plant which bears many ascending branches. Flowering period is May to September. Leaves simple, linear or oblong, obtuse or subacute, apiculate, pubescent on both sides, hairs appressed, silky, petiolate. Inflorescences erect terminal or lateral raceme, pedicel long, bract minute, bracteoles 2, below the calyx. Calyx pubescent, teeth linear, lanceolate. Corolla bright yellow. Vexillum ovate, oblong, slightly excreted. Fruit legume, sessile pubescent 10-15 seeded.

Medicinal use-The seeds are used to purify the blood. It is also used in impetigo, soriasis and as an emmenagogue.

2) Seeds of *Cajanus cajun*(L). Millsp, Family Fabaceae. It is commonly known, as pigeon pea, congo pea, red gram, yellow dahl, arhar, tuver. It is an erect woody, annual or short lived perennial shrubs or small tree, with tap root; stem angled and pubescent; leaves trifoliate, alternate, set in spiral around the stem, leaflets oblong, lanceolate, pubescent, discolours, green aloles, grayish, green below, stipules linear. Flowers yellow, sometimes with purple or red strears or plain red; calyx with 5 linear teeth. Pods flat, acuminate, pubescent containing 2-9 oval to round seeds varying in color from light beige to dark brown.

Medicinal use- Seeds contain high percentage of protein. It is utilize for the treatment of diabetes and as an energy stimulant. It is also used in constipation, to staunch blood, as an analgesic and to Rill parasites. Leaves are used in food poising ascolic parts. Seeds, leaf and young stems are used to cure gingivitis, stomatitis and as a toothbrush. Fresh juice of/boiled leaves are given orally to nullify the effect of intoxication and as a laxative. Leaf paste is applied in oral ulcers and inflammations. Leaves and seeds are applied as poultia over the breast to induce lactation.

3) Fruits and seeds of *Moringa oleifera* Lam. Family Moringaceae- Commonly known as drumstick tree, horseradish tree, ben oil tree or benzoil tree. It is a fast growing deciduous tree. Rooted deeply; leaves imparipinnate, pub scent, pale green, obovate, terminal, leaflets slightly larger, basal leaflets pairs, sometime tripinnate; flowers. Sweet, scented, cream white, arrange in panicles, with 5 unequal petals,

slightly larger than the sepals, yellow dots at the base, petals narrowly spathulate, veined, white, bracts linear, calyx 5 lobed, linearly-lanceolate, reflexed, puberulose outside 5 stamens, fertile alternating with 5-7 staminodes, filaments villous at the base, one celled, oblong villous, ovules many, style slender, fruits long, pointed, triangular, seeds, oily, black in typical 3-winged seed coat.

Medicinal use-The green pods are sought after vegetable. Seed oil is used for cooking as a lighting fuel, for making cosmetics and soaps. Seed powder is used as a coagulant and water purifier. Leaves are considered to be a panacea for malnutrition, also fed as much to animals to increase their milk yield. The flowers can be made into a drink. The roots are also edible with the mashed, peeled root producing a seasoning. Most part of the tree has as antibacterial, anti-inflammatory, analgesic and anti-tumor effects. It is also used for a range of aliments including mouth sores, rheumatism, diabetes, venomous bites, scurvy, heart problems and skin disorders.

4) Fruits and seeds of *Hibiscuscannabinus*L. Family Malvaceae- Commonly called as Deccan hemp, Java jute, Ambaadi. It is an annual or biennial herbaceous plant. Stem thick, branched, leaves variable in shape, leaves near the base of the stem being deeply lobed with 3-7 lobes while leaves near the top of the stem are shallowly lobed or unlobed, lanceolate. Flowers white, yellow or purple; when white or yellow, the centre is still dark purple. Fruit capsule, seeds many.

Medicinal use-The leaves were consumed in humans and animal diets. Oil seeds are used for cosmetics, industrial lubricants and for biofuel products. It is high in omega poly unsaturated fatty acids which are expected to play a role in cardiovascular health. They are also important for reducing cholesterol and heart diseases.

5) Flowers of *Sesbania grandiflora*(L).Poiret.Family Fabaceae- It is commonly known as vegetable humming buried or hummingbird pairs. It is a fast growing tree. The leaves regular, rounded, with leaflets in 10-20 pairs more and add one flowers white or red, oblong, 2-4 flowers racemes, calyx campanile, late and shallowly 2 lipped. Pods slender, falcate or straight, with a thick suture, beans, green contain approximately 30 seeds.

Medicinal use –It is of advanced glycation end products. Flowers are eaten as a vegetable. The young pods are believed locally to be a cure for cancer rare.

Preliminary phytochemical screening-A systematic and complete study of crude drugs includes a complete investigation of both primary and secondary metabolites derived from plant metabolism. Different qualitative test was performed for establishing profiles of various extracts for their nature of chemical composition. The extracts obtained were subjected to following chemical tests for identification of various Phytoconstituents as per the methods given by Harborne. There were no previously isolated compounds (Kokate *et al*., 1994; Harborne, 1998).

Test for Sterols. Salkowski test: Few drops of concentrated sulphuric acid was added to the chloroform solution, shaken and allowed to stand, appearance of red colour in lower layer indicates the presence of sterols.

Test for Tri-terpenes-Salkowski test: Few drops of concentrated sulphuric acid was added to the chloroform solution, shaken and allowed to stand, appearance of golden yellow colour indicates the presence of triterpenes.

Test for Saponins-Foam test: Small amount of extract was shaken with the little quantity of water, if foam produce persists for 10 minute; it indicates the presence of Saponins.

Test for Glycosides-Kellar Killani test: The test extract was dissolved in glacial acetic acid and after cooling, 2 drops of ferric chloride solution were added. These contents were transferred to test tube containing 2 ml of sulphuric acid. A reddish brown colour ring observed at the junction of two layers.

Test for Alkaloids-The various extract fractions were basified ammonia and extracted it with chloroform. The chloroform solution was acidified with dilute hydrochloric acid. The acid layer was used for testing the alkaloids.Mayer's test (Potassium Mercuric Iodine Solution): The acid layer was treated with few drops of Mayer's reagent. Formation of creamy white precipitate indicates the presence of alkaloids.

Test for Carbohydrate-Small amount of extracts/ fraction were dissolved in little quantity of distilled water and filtered separately. The filtrates were used to test for presence of carbohydrates.Molish test: The extract was treated with Molish reagent and concentrated sulphuric acid was added from the sides of the tube to the form a layer. A reddish violet ring shows the presence of carbohydrates.

Test for Tannins-Ferric chloride test-To the extracts, a few drops of 1% neutral ferric chloride solution was added. Formation of blackish blue color indicates the presence of tannins.

Test for Flavonoids- Lead acetate test: To the extract, a few drops of aqueous basic lead acetate solution were added. Formation of yellow precipitate indicates the presence of flavonoids.

Test for Lactones-Baljet test: To the extract, sodium picrate solution was added. Formation of yellow color indicates the presence of lactones.

Test for Protein-Million's reagent test: Mixed the extract with Million's reagent. Formation of brick red precipitate indicates the presence of protein.

Test for Coumarins-1g of powered drug kept with water in a test tube, covered with paper, soaked in NaOH. It is diluted and boiled. Yellow fluorescence indicates the presence of coumarins after examination under ultra violet lamp.

Test for Anthocyanin/ Betacyanins-Small amount of extract were taken and add NaOH into it. Boil it for 5-10 minute.The extract is yellow colour in presence of Betacyanin while purple or blue colour in the presence of anthocyanin.

For the phytochemical analysis extract of the above mentioned, plant parts were prepared in two different solvents i.e. distilled water and ethanol.

III. RESULT AND DISCUSSION

Table 1: Preliminary phytochemical screening of Crotalaria juncea

S.N.	Test	Distilled water	Ethanol
1	Sterols	-ve	-ve
2	Tri-terpenes	-ve	+ve
3	Saponins	+ve	-ve
4	Glycosides	-ve	+ve
5	Alkaloids:	-ve	-ve
6	Carbohydrate	+ve	+ve
7	Tannins	+ve	+ve
8	Flavonoids	+ve	+ve
9	Lactones	+ve	+ve
10	Protein	-ve	+ve
11	Coumarins	+ve	+ve
12	Anthocyanin/ Betacyanins	-ve	-ve

Table 2: Preliminary phytochemical screening of Cajanus cajan

S.N.	Test	Distilled water	Ethanol
1	Sterols	-ve	-ve
2	Tri-terpenes	-ve	-ve
3	Saponins	+ve	+ve
4	Glycosides	+ve	+ve
5	Alkaloids:	-ve	-ve
6	Carbohydrate	+ve	+ve
7	Tannins	-ve	+ve
8	Flavonoids	+ve	+ve
9	Lactones	+ve	+ve
10	Protein	-ve	-ve
11	Coumarins	-ve	-ve
12	Anthocyanin/ Betacyanins	+ve	+ve

Table 3: Preliminary phytochemical screening of Moringa oleifera

S.N.	Test	Distilled water	Ethanol
1	Sterols	-ve	-ve
2	Tri-terpenes	-ve	-ve
3	Saponins	+ve	-ve
4	Glycosides	-ve	+ve
5	Alkaloids:	+ve	-ve
6	Carbohydrate	+ve	+ve
7	Tannins	+ve	-ve
8	Flavonoids	+ve	-ve
9	Lactones	+ve	+ve
10	Protein	-ve	-ve
11	Coumarins	-ve	-ve
12	Anthocyanin/ Betacyanins	-ve	-ve

Table 4: Preliminary phytochemical screening of Hibiscus cannabinus

S.N.	Test	Distilled water	Ethanol
1	Sterols	-ve	-ve
2	Tri-terpenes	-ve	-ve
3	Saponins	-ve	+ve
4	Glycosides	-ve	-ve
5	Alkaloids:	-ve	+ve
6	Carbohydrate	-ve	+ve
7	Tannins	-ve	+ve
8	Flavonoids	+ve	+ve
9	Lactones	+ve	+ve
10	Protein	-ve	-ve
11	Coumarins	-ve	-ve
12	Anthocyanin/ Betacyanins	-ve	-ve

Table 5: Preliminary phytochemical screening of Sesbania grandiflora

S.N.	Test	Distilled water	Ethanol
1	Sterols	-ve	+ve
2	Tri-terpenes	-ve	+ve
3	Saponins	+ve	+ve
4	Glycosides	-ve	+ve
5	Alkaloids:	+ve	-ve
6	Carbohydrate	-ve	+ve
7	Tannins	-ve	-ve
8	Flavonoids	+ve	+ve
9	Lactones	-ve	+ve
10	Protein	-ve	-ve
11	Coumarins	-ve	-ve
12	Anthocyanin/ Betacyanins	-ve	-ve

Table 1-5showsaqueous &ethanolic solvent phytochemical test such as Sterols, Tri-terpenes, Saponins, Glycosides, Alkaloids, Carbohydrate, Tannins, Flavonoids, Lactones, Protein, Coumarins, Anthocyanin/ Betacyanins in Crotalaria juncea, Cajanus Cajun, Moringa oleifera, Hibiscus cannabinus, Sesbania grandiflora.

In Sesbania grandiflora positive test for Sterolswas seen only in ethanolic solvent while in all other plants it shows negative test in both solvent ie. aqueous and ethanolic. In Sesbania grandiflora &Crotalaria junceait showspositive test for Tri-terpenes in ethanolic solvent while in all other plants it shows negative test in both solvent ie. aqueous and ethanolic. In all above plant except Hibiscus cannabinus itshows positive test for Saponins inaqueous solventwhile ethanolic solvent of Cajanus Cajun, Hibiscus cannabinus, Sesbania grandiflorait shows positive test. In aqueous solvent of Cajanus Cajun positive test forGlycosidesis seen while in ethanolic solvent of Hibiscus cannabin us it shows negative test. In aqueous solvent ofMoringa oleifera & Sesbania grandifloraas well asin ethanolic solvent of Hibiscus cannabinusshows positive test for Alkaloids In all above plants except in aqueous solvent of Sesbania

grandiflora & Hibiscus cannabinus it showspositive test for Carbohydrate in both the solvent.

Crotalaria juncea & Moringa oleifera shows, positive test while Cajanus Cajun, Sesbania grandiflora, Hibiscus cannabin us shows negative test in aqueous solvent for Tannins. In ethanolic solvent of Sesbania grandiflora & Moringa oleifera shows negative test while in Crotalaria juncea, Cajanus Cajun& Hibiscus cannabinus it shows positive test for Tannins. In all plantsexcept in ethanolic solvent of Moringa oleiferait shows positive test for Flavonoids. . In all plantsexcept in aqueous solvent of Sesbania grandiflora it shows positive test for Lactones. Except in ethanolic solvent of Crotalaria junceaall plants showsnegative test for Protein. Positive test for Coumarins in both aqueous as well as ethanolic solvent was seen while negative test for Anthocyanin/ Betacyanins were observe in all other plants except in Cajanus cajun.

REFERENCES

[1] Anwar F., S. Latis, M. Ashral and A. Gilan, 2007. *Moringaoleifera* a food plant with multiple medicinal uses. Journal of Phytotherphy Research 21: 17-25.

[2] Anwar F, Rashid U (2007) physiochemical characterstics of *Moringaoleifera* seeds and seed oil from a wild provenance of Pakistan. Pakistan Journal of Botany 39; 1443-1453.

[3] Amaglo N. K.,Bennett, R.N, Locurto R. B, *et al*. profiling selected phytochemicals and nutrients is different tissues of the multipurpose tree *Moringaoleifera* L., grown in Ghana food chemistry 2010; 122:1047-1054

[4] Adams R and Gianturco M. alkaloids of *Crotolariajuncea*. J Am ChemSoc 1956; 78: 1919-1921.

[5] Al. et al., 2005 B.H. Ali, N. Al wabel, G. Blunden Phytochemical, pharmacological and toxicological aspects of *Hibiscus canabinus* L. a review.

[6] Burali SC, Kanagralkar V, Sravani 05, Patil SL; The beneficial effect of ethanolic extract of *Moringaoleifera* on osteoporosis Pharmaceutical Application 2010:

[7] Bhanumanti S, Chhabra Sc, Gupta SR, Krihnamoorthy V. 2-0- Methylcajanone: a new isoflavanone from *Cajanuscajan*. Photochemistry. 1979; 18 (4) 695. doi 10. 10161S003- 9422(00) 84304-6]

[8] B.H., Lawati I., Beegam S., Zida, A., Al salam, S., Nemmar. A., *et al.* (2012) Effects of *Hibiscus canabinus* and its Anthocyanins on some reproductive aspects in rats. Natural product communications.

[9] DahiyaJs, Strange RN, Bilyard KG, Cooksey CJ, Garraatt PJ. 2 isoprenylatedisoflavonephytoalexins from *Cajanuscajan*. Phytochemistry 1984; 23 (4): 871-873. Doi 10. 101S0031-94122 (00) 8504 46-3nA

[10] Dahira D., onubiyi JA, and Umara HA. Phytochemical screening and antiulcerogenic effect of *Moringaoleifera* aqueous leaf extract; Art. J. Trad. (AM 2006; 3(3); P.70-75.

[11] Dhivya R, Manimegalal K. preliminary phytochemical screening and GC- MS profiling of ethanolic flower extract *Crotolariajuncea* Linn. (Apocynaceae). Journal of Pharmacognosy and Photochemistry 2013;

[12] EL-saidy, S.M., Ismail, I., EL. Zeghbi, M. Antioxidant and microbial efficacy of Bissap *Hibiscus canabinus*. Journal of agriculture research 1992;

[13] Fojas F R., Barrientos C.M., Capal T.V., Cruzada S.F., Sison F.M., co y.c., chua N.G., Gavina T.L. Preliminary phytochemical and pharmacological studies of *Sesbanaia grandiflora* 1982;

[14] H. Nuhu, Em Abdurrahman, M shok Comparative analysis of the Alkaloids of 3 *Crotolaria* species 2009;

[15] Harborne, J.B., Phytochemical methods; A guide to modern techniques of plants analysis 1998;

[16] J. B. Harborne 1998 phytochemical methods London Chapman and Hills.

[17] Jain M and Jain V. Pharmacognostical, phytochemical and pharmacological review on *Crotolariajuncea*. PhTe med 2014; 3(2): 469-475

[18] Javed MA. Saleem M, yamin M and Chauari TA. Lipid and Protein constituents of *Crotolariajuncea*

[19] L. Natural product science 1999; 5(3): 148-150

[20] Khandelwaldr K.R. "Practical Pharmacognosy" 20thedition, 2009, published by niraliprakashan p. no. 25.1-25.

[21] Kokate C., purohit A. and Gokale S. 1994. Practical Pharmacognosy, vallabhprakashan New delhi, Edition.10,112-120