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Review Article

Tuberous Vegetables

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Neutraceutical Potential of Some Kanda Shak (Tuberous Vegetables) - A Review

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Ahar is regarded as Mahabheshaja in Ayurveda. It refers to any substance that is chewed and ingested for nutritional and energy purposes. Shak (vegetables) are included in the diet as essential components by ancient sages, contemporary ayurvedic and modern medical scientist / nutritionists. In Charak Samhita and Ashtanga Hridaya, tubers are mentioned under Ahar Varga and Acharya Sushrut especially explained it in Kanda Varga (Group of tuberous vegetables). Tuberous vegetables boast several noteworthy properties that contribute to their nutritional value as they are rich in all essential dietary components like carbohydrates, proteins, fats, vitamins and dietary fibres. In addition, tubers also contain vitamins, minerals, trace elements and biologically active molecules that function as antioxidants, phytoestrogens, and anti-inflammatory agents. Consumption of these tubers may play a role in preventing diseases in which free radicles are involved such as cancer, ageing, cardiovascular diseases. Present review is an attempt to explore nutraceutical potential of Kanda Shak described in Brihattrayi and a comparative analysis with their nutraceutical composition explored by modern analytical studies.

Keywords: Ahar, Kanda Shak, Tubers, Brihattrayi, Nutraceutical value

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Introduction

Ahar is considered as best preventive medicine and is considered prime factor among *Trayopsthambh* (*Ahar, Nidra* and *Bramhacharya*). *Anna* (food grains) is the major constituent of *Ahar* for maintenance of good life, health and wellness along with other constituents like vegetables. *Ahar* is viewed as a mean to promote longevity (Ayush) and vitality (*Ojas*) in *Ayurveda*. A balanced diet that supports optimal digestion, nourishment, and detoxification is believed to enhance overall vitality and resilience to disease. In this context one quote of *Acharya* Kashyap is worth mentioning according to which "There is no medicine like food" (KS.Kh.4.5).**[1]** Thus, there can be no medicine substitute for food. By adhering to a healthy, balanced diet, a person can become disease-free. The food we eat on a daily basis affects our physical and emotional well-being. There is a strong correlation between nutrition, health, and wellness. A detailed classification of *Ahar Dravya* is available in all the texts of *Brihattrayi*. *Acharya* Charak classified *Ahar Dravya* in 12 *Vargas* in *Annapaanvidhiadhya* (CS.Su.27)**[2]**, *Acharya* Sushrut classified *Ahar Dravya* in 13 *Varga* in *Annapaanvidhiadhyay* (SS.Su.46)**[3]** and *Acharya* Vagbhata classified *Ahar Dravya* in 7 *Varga* in *Annaswarup vigyaniya Adhayay* (AH.Su.6).**[4]** The vegetables are grouped under *Shak Varga* in Ayurvedic classics. The vegetables are consumed for the nutrition and as the best calorie diet. The *Shak Varga* consists of the vegetables we incorporate into our daily diet as *Ahar* (food). They are a major source of nutrition with a massive quantity of essential dietary constituents.**[5]** *Acharya Bhav Mishra* classified *Shak Varga* into 6 categories based on their origin and appearance such as - *Patra Shak* (leaf as vegetables*), Pushpa Shak* (flower as vegetables*), Phala Shak* (fruit form of vegetables*), Naala Shak* (hollow stems / leaf petioles etc. used as vegetables), *Kanda Shak* (tubers as vegetables), *Samswedaja* (grows with the help of moisture in *Bhoomi* or wood - Fungi)**[6]**, which are said to be gradually heavier in digestion (*Uttarottara Guru*).**[6]** There also appears detailed description of best & worst varieties of dietary constituents among their groups in classical texts of *Ayurveda* like 20 pairs of *Dravyas* in context of *Hitatama* & *Ahitatama Ahar Dravyas* where *Aaluk* is regarded as *Ahitatama* & *Shringber* as *Hitatama Kanda* (CS.Su.25).**[7]**

Tuberous vegetables boast several noteworthy properties that contribute to their nutritional value and culinary versatility.

- Due to high carbohydrate content, tuberous vegetables serve as an important energy source in many diets, providing sustained energy levels throughout the day.
- Tuberous vegetables are an excellent source of dietary fibre, which promotes digestive health. Fiber, a type of complex carbohydrate helps passage of food through digestive system. Studies show that fibre may also improve vitamins and minerals absorption in the body, which could potentially raise body energy levels.
- Versatility in Cooking - Tuberous vegetables can be prepared in various ways.
- Long Shelf Life - Many tuberous vegetables, such as potatoes and sweet potatoes, have a relatively long shelf life when stored properly, making them convenient pantry staples that can be stored for extended periods without spoiling.

Materials and Methods

A thorough review of available texts starting from Vedic texts to contemporary scientific publications & online database has been under taken. Information retrieved comprehensively has been analysed & documented to make review all inclusive.

Observations

Botanical specifications of *Kanda Shak* - Botanical identity of maximum number of herbs classified under *Kanda Shak* have been established by different commentators and scholars of Ayurveda. Some of herbs could not be satisfactorily appropriated with their botanical sources. A short discussion regarding botanical identity of different plants classified/included in the group of *Kanda Shak* is being produced here.

1. Vidaari Kanda - Pueraria tuberosa Roxb ex.Willd. - Fabaceae
2. Munjataka - Orchis latifolia. Linn**[8]** - Orchidaceae
3. Amlika Kanda - Oxalis corniculata Linn**[9]** - Oxalidaceae
4. Pindaaluk - Dioscorea alata Linn**[10]** - Dioscoreaceae
5. Utpalnaal - Nymphea nouchali Burm F.**[11]** - Nympheaceae

*6. Taruta - Dioscorea bellophylla***[12]** - Dioscoreaceae
7. Bisa - Nelumbo nucifera **[13]** - Nelumbonaceae
8. Shaaluk - Nymphea pubescens **[14]** - Nympheaceae
9. Kasheruk - Scripus grossus Roxb.**[15]** - Cyperaceae
10. Shringatak - Trapa bispinosa Hort.**[16]** - Trapaceae
11. Kumuda - Nymphea alba. Linn**[17]** - Nympheaceae
12. Mrunal - Nelumbo nucifera Gaertn**[18]** - Nelumbonaceae
13. Shatavari - Asparagus racemosus - Liliaceae
*14. Varahi Kanda - Dioscorea bulbifera***[19]** - Dioscoreaceae
15. Maan Kanda - Alocasia indica Roxb**[20]** - Araceae
16. Kashthaalu - Dioscorea sp.**[21]**
17. Raktaalu - Dioscorea sp.**[21]**
18. Madhvaalu - Dioscorea sp.**[21]**
19. Hastaalu - Dioscorea sp.**[21]**
20. Indiwar - Nymphea stellata **[22]** - Nympheaceae
21. Palandu - Allium cepa Linn - Liliaceae
22. Rason - Raphanus sativus Linn - Liliaceae
23. Mulak (Baalmuli / Mahat Muli) - Raphanus sativus Linn - Brassicaceae
24. Suran - Amorphophallus paeoniifolius - Araceae
25. Grinjanak - Daucus carota L. - Apiaceae
26. Bhu Kanda - Agaricus campestris L**[23]** - Agaricaceae
27. Shati - Hedychium spicatum Ham - Zingiberaceae

According to *Acharya Bhav Mishra,* in *Pushpa Varga, Bisa* and *Mrunal* are referred to as *Kamal Naal. Priya Nighantu* states that *Mrunal* is the *Kamal Naal* (lotus stalk) and *Bisa* is the *Bhasinda* (lotus stem). Commenting on SS.Su.46.298*, Acharya Dalhan's* states that *Bisa* is *Padma Mulam* and *Mrunal* is *Padma Mulat Shtula Praroha.*

Table 1: *Kanda Shak*: Classical Pharmacological Properties / Indications

SN	Shak Name	Classical Pharmacological Properties/ Indications
1.	Vidaari Kanda Pueraria tuberosa Roxb ex. Wild	Madhur, Sheeta, Balya (Strengh and immunity promotor), Mutral (diuretic), Jeevan (Tonic), Vrishya (Aphrodisiac), kanthya, Rasayan (C.S.); Vatpittahar, Svarya (voice enhancer), Ati-mutral, Brihan (S.S); Guru (A.H.)
2.	Munjataka Orchis latifolia. Linn	Madhur, Sheeta, Vatpittahar, Balya (Strength promotor), Guru, Snigdha, Brihan, Vrishya (Aphrodisiac) (C.S.); Shukrakrit (A.H.)
3.	Amlika Kanda Oxalis corniculata Linn.	Kaphvatghna, Grahi, Laghu used in Madatyaya (alcohol intoxication), Arsha (Piles), Grahani (Malabsorption syndrome)
4.	Pindaaluk Dioscorea alata Linn	Tridoshkarak, Baddhavin-mutra, Mukhpriyam (C.S.); Kaphakar, Guru, Vatprakopak (S.S); Katu, Ushna (Hot potency), Pittavardhan, Vatkaphaha (A.H.)
5.	Utpalnaal, Nymphea nouchali Burm.F	Madhur, Kashaya, Sheeta (Cool potency), Kapha-marutkopana (C.S.); Vatprakopa, Pittashamak (S.S); Ruksha, Guru, Grahi (A.H.)
6.	Bisa, Nelumbo nucifera Gaertn.	Sheeta, Guru, Vishtambhi (C.S.); Avidahi, Raktpitta-prasadan, Ruksha, Vatkar (S.S); Grahi (A.H.)
7.	Shaaluk, Nymphea pubescens Willd	Sheeta, Guru, Vishtambhi (C.S.); Ruksha, Grahi (S.S)
8.	Kasheruk, Scripus kysoor Roxb.[22]	Sheeta, Guru, Vishtambhi (C.S.)
9.	Shringatak, Trapa bispinosa Roxb.Hort	Guru, Vishtambhi, Sheeta (C.S.), (S.S)
10.	Kumuda Nymphea alba. Linn.	Madhur, Kashaya, Sheeta, Kapha Marutkopana (C.S.) Pittashamak, Vatprakopa (S.S)
11.	Taruta, Dioscorea bellophylla Voight.	Sheeta, Guru, Vishtambhi (C.S.)
12.	Mrunal, Nelumbo nucifera Gaertn.	Madhur, Sheeta, Guru, Raktpittahar, Stanyavriddhikar (S.S), Grahi, Ruksha (A.H.)
13.	Shatavari,Asparagus racemosus Willd.	Madhur, Tikta, Sheeta, Vatpittahar, Vrisha, Hridya (heart disorders), Medha -agnivardhan (S.S.)
14.	Varahi Kanda Dioscorea bulbifera Linn.	Katu, Shleshmghna, Balya, Vrishya, Rasayan, meha-krimi-kushta har (S.S.)
15.	Maan Kanda Alocasia indica. Roxb.	Madhur, Sheeta, Guru (S.S.)
16.	Indiwar, Nymphea stellata Willd.	Guru, Raktpittahar, Stanya-Vriddhikar
17.	Palandu Allium cepa Linn.	Katu, Natiushnavirya, Vathar, Pittakar (S.S.) Kaphapitta Karak (A.H.)
18.	Rason Allium sativum Linn.	Katu, Ushna, Vrishya, Medha-swar-varna-Chakshu-bhagnasandhankar, Shool, Gulma (Abdominal lump), Aruchi (testlessness), Kasnashan (cough) (S.S.), Snigdha, Guru, Peenas (chronic rhinitis /sinusitis), Shwas (asthma), Rasayan, Hridya, Keshya (A.H.)
19.	Mulak (Baalmuli) Raphanus sativus Linn.	Katu, Tikta, Ushna, Vanhidipani, Sarvadoshhar, Hridya, Rochani (S.S.), Avyaktaras, Kshar, Gulma, Shwas, Vran, Netra, Agnisad (digestive impairment), Udavarta (upward movement of gases), Peenas Nashan (A.H.)

20.	Mahat Muli Raphanus sativus Linn.	Katu, Madhur, Ushna, Guru, Vishtambhi, Tridoshakrit (S.S.), Abhishyandi, Snigdha, Vatjita (A.H.)
21.	Suran Amorphophallus paeoniifolius Dennst.	Katu, Ishat-kashay, Ushna, Ruksha, Vishtambhi, Guru, Kaphavatala, Pittahar (S.S.), Kaphaghna, laghu, Arshasapathyam (A.H.)
22.	Grinjanak, Daucus carota L	Tikshna, Grahi, Vatkaphhar, Arshasapathyam (A.H.)
23.	Bhu Kanda,Agaricus campestris L	Atidoshala (A.H.)
24.	Shati, Hedychium spicatum Buch. Ham	Tridoshghna, Laghu, Grahi (A.H.)

Table 2: Neutraceutical Potential of Tubers

SN	Tubers Name	Neutaceutical Potential /Value
1.	Vidaari Kanda	85.1% dry matter, 64.6% carbohydrates, 10.9% protein, 0.5% ether extract, 28.4% crude fibres, β-sitosterol, sucrose, glucose and fructose[24]; it is a source of starch, polysaccharides, proteins and minerals like calcium, phosphorous and strontium.
2.	Munjataka	Starch, Sugar, mucilage, albumin, Tannins volatile oils.[25]
3.	Pindaaluk	Starch (250-300 mg/g), Soluble sugar (1-3.9%), Soluble protein (10-15 mg/g), 0.16-0.33% lipids, 4.98-6.32% protein, 85.84% carbohydrates, total dietary fibre 4.1-11.0%, and significant amount of vitamins, minerals and polyphenol compounds. Phosphorous, calcium. magnesium, potassium, Sodium, manganese, copper, zinc. The ranges of minerals in mg per kg (dry weight) were P-878-1900mg, Ca-260-410mg, Mg-390-580mg, K- 10,550-20,100mg, Na-84-131mg, Mn-4.8-22.1mg, Cu-12.3-15.7mg and Zn-10.1-14.1mg.[26]
4.	Utpalnaal	Carbohydrate 76.5%, Crude Protein 10.76 %, Crude Fat 2.40%, Crude Fibers 0.64%, Ash 3.0%, Moisture 9.07%, Total Sugars 6.06%, Reducing Sugars 1.26%, Acidity 1.18%, Vitamins like Ascorbic Acid 3.12 mg/100g, Riboflavin 1.11 mg/100g, Thiamine 0.05 mg/100g, Niacin 1.45 mg/100g, Minerals includes Iron 1.98 mg/100g, Zinc 1.33 mg/100g, calcium 148.55 mg/100g, Total Polyphenols 0.12 mg/mL, Gallic acid equivalent Total Flavonoids 50.63 mg/mL, Rutin equivalent, Total carotenoids 115.22 µg/100g, Anthocyanin 0.16%, Lycopene 0.007 µg/100g, Phytate 149.86 mg/100g, Oxalate 24.97 mg/100g.[27]
5.	Bisa	Moisture72.14%, Starch 10.05gm, Carbohydrates 16.03gm, proteins 2.60gm, fat 0.10gm, Fibres 4.20 gm, Vit C 38 mg, Total ash 1.18 gm, Calcium 40.00 mg, Iron 1.07 mg, Phosphorous 58 mg, Pottasium 450 mg per 100g.[28]
6.	Shaaluk	Carbohydrates 67.7%, Crude Protein 8.57%, Crude Fiber 9.78%, Fat 2.8%, Ash 3.11%, Moisture 8.04%
7.	Kasheruk	Protein5-7%, Gum 6-10%, starch 65%, Some alkaloids in small amount.[29]
8.	Shringatak	Ample quantity of minerals like sodium, Potassium, calcium, zinc and vit.A, Vit.c, Vit.E, Acids, Minerals, calcium, phosphorus, iron, copper, zinc, manganese, magnesium, sodium and potassium, carbohydrates and vitamins, namely Vitamin B-complex (thiamine, riboflavin, pantothenic acid, pyridoxine, nicotinic acid), Fats, crude Fibres, D-amylase.[30]
9.	Kumuda	Ash 19.25-20.59%, Proteins 9.96-9.97%, Fibres 12.84-15.14%, lipids 1.64-2.06%.[31]
10.	Taruta	Per 100g fresh tuber contain Carbohydrates 25–30 g, Starch 20-25 g, Protein 1.5–2.5 g, Dietary Fiber 3–5 g, Fat 0.2–0.5 g, Moisture 60–70% Ash minerals 0.7–1.2 g, Energy 100–120 kcal.
11.	Mrunal	Moisture72.14%, Starch 10.05gm, Carbohydrates 16.03gm, proteins 2.60gm, fat 0.10gm, Fibres 4.20 gm, Vit C 38 mg, Total ash 1.18 gm, Calcium 40.00 mg, Iron 1.07 mg, Phosphorous 58 mg, Potassium 450 mg per 100g.[28]
12.	Shatavari	Tuberous roots contain 4.6-to 6.1% Protein, Carbohydrates36.8 to 47.5%, Phenols 3.1 to 5.2mg/g, Tannins 4.8 to5.1mg/g, Saponins 4.1 to 5% and ash 6.5 to 7.4%, Rutin, Quercetin, and flavonoids, monosaccharide is galactose, 54%; glucose, 28%; rhamnose, 4%; xylose, 5% and arabinose, 8%, higher amount of phenolic compounds such as ferulic acid, rutin, quercetin, kaempherol and flavenoides.[32]
13.	Varahi Kanda	Minerals and vitamins reported in the tubers were Protein (4.4 g), Fat (1.5 g), Fibre (1.0 g), Carbohydrates (22.2 g), Calcium (16 mg), Phosphorus (36 mg), Iron (1.0 mg), Carotene (480 IU of vitamin A), Thiamine (0.07 mg), Nicotinic acid (0.76 mg), Riboflavin (0.01 mg) and traces of vitamin C.[33]
14.	Maan Kanda	Protein (3.034-0.570) g/100 g dry weight, soluble carbohydrate: (8.84-1.45) g/100 g dry weight; total carbohydrate (45.58-0.59) g/100 g dry weight, Fat (1.426-0.550) g/100 g dry weight, Fibre (2.95-0.69) g/100 g dry weight, Moisture (42.48-0.49) g/100 g dry weight, Ash (2.62-0.45) g/100 g dry weight, Ascorbic acid (76.65-4.03) mg, Alpha-tocopherol(69.54-2.06) mg per 100gm of dry weight.[34]
15.	Indiwar	Moisture 4.2 %, Crude Fat 0.25 %, Protein 14.6 %, Carbohydrates 67.5 %, Fiber 5.45 %, Ash 3.95 %.[35]
16.	Palandu	Onions are low-calorie, nutrient-dense vegetables composed primarily of Water (89–91 %) and Carbohydrates (9–10 %), including simple sugars and dietary fibre. Onions provide small amounts of protein and are nearly fat-free. They are also rich in vitamins such as Vit. C, B6, and folate, and also contain essential minerals including Potassium, Calcium, Magnesium and Phosphorus, Proteins1.2g, Fat 0.1g, Minerals 0.4g, Fiber 0.6g, Carbohydrates 11.1g, Calcium 46.9 mg, Phosphorous 50mg, Potassium 127mg, Iron o.6mg, Magnesium 16mg, Sodium 4mg, Copper 0.18mg, Manganese 0.18mg, Zinc 0.41mg, Selenium 0.5mg, Thiamine 0.05mg, Riboflavin 0.03mg, Niacin 0.4mg, Folic acid 6mg per 100g[36]

17.	Rason	Carbohydrates 33.6g, Sugar 1g, Dietary Fiber 2.1g, Fat 0.5g, Proteins 6.36g, Thiamin (Vit.B1) 0.2mg, Riboflavin (Vit.B2) 0.11 g, Niacin (Vit.B3) 0.7 g, Pyrodoxine (Vit.B6) 1.235 mg, Folate (Vit.B9) 3 ug, Vit.C 31.2 mg, Calcium 181mg, Iron 1.7mg, Magnesium 25mg, Phosphorous 153mg, Sodium 17mg, Zinc 1.16mg per 100g.[37]
18.	Mulak (Baalmuli)	Proteins 570mg, Fat 70mg, Carbohydrates 3030mg, Fibre 320mg, Potassium 380mg, Calcium 148mg, Vit.C 38.8mg per 100g.[38]
19.	Suran	Protein 9.81 ± 2.5mg, Soluble carbohydrate 6.67 ± 1.65mg, Total carbohydrate 25.54 ± 6.52mg, Fat 1.414 ± 0.79mg, Fibre 5.7 ± 1.2mg, Ascorbic Acid 76.65 ± 10.5mg, Alpha Tocopherol 76.65 ± 10.5mg, Beta Carotene 0.19 ± 0.05mg, Lycopene 2.03 ± 0.58mg, Moisture 66.08 ± 1.98, Ash 4.83 ± 0.54 per 100 gm.[39]
20.	Grinjanak	Moisture content of 86–89 g/100 g, Protein 0.9–1.09 g/100 g, Fat 0.24 g/100 g, Carbohydrates 9.58 g/100 g, and total sugars 4.74 g/100 g. Carrots are a good source of minerals such as Ca (34 mg/100 g), Fe (0.4 mg/100 g), P (25 mg/100 g), Na (40 mg/100 g), K (240 mg/100 g), Mg (9 mg/100 g), Cu (0.02 mg/100 g), and Zn (0.2 mg/100 g). Carrot roots contain various water-insoluble polysaccharides including cellulose 71.7%, Hemicellulose 13.0%, and lignin 15.2%. Carbohydrates 6.100 ± 0.346%, Specific gravity 1.069 ± 0.003, pH 6.233 ± 0.058, Ascorbic acid (mg/100g) 16.667 ± 1.332 , Ca++ (mg/100g) 55.000 ± 0.000, Fe++ (mg/100g) 1.667 ± 0.153, PO4 (mg/100g) 44.333 ± 1.155, Thiamine (mg/100g) 0.057 ± 0.006, Niacin (mg/100mg) 0.300 ± 0.000, Riboflavin 0.100 ± 0.000 (mg/100g), β-carotene 2730 ± 43.589, colour (out of 10) 2.000 ± 0.000 and vitamin A 2805 ± 6.53.[40]
21.	Bhu Kanda	Moderate amount of protein, ranging from 20.4-38.3% on a dry weight basis. The carbohydrate content is also relatively high, between 33.2-48.4%. Fat content is low, typically between 0.8-6.2%. Additionally, it provides dietary fiber, with amounts ranging from 2.0-18.6%. [41]
22.	Shati	Minerals in ppm like Calcium (3400), Phosphorous (8800), Potassium (6600), Magnesium (5700), Iron (440), Manganese (290), Zinc (155), Nickel (12), Antioxidants like xanthophyll 0.23mg, α-carotene 6.90mg, β- carotene 19.30mg, total phenolics 218mg per 100gm present.[42]

Result

1. Shak Varga (vegetables) are essential components of Indian diet.

2. Kanda Shak have been considered to hold a unique position among *Shak* due to their diversified nutraceutical potential.

3. Vidari Kanda is a rich source of dietary fibres, carbohydrates, proteins and biologically active molecules like β-sitesterol, various minerals and trace elements essential for human body.

4. Munjatak contain a fair amount of starch, sugar, mucilage and other important nutraceuticals.

5. Pindaluk along with starch, sugar, proteins have been reported to contain various polyphenolic compounds, minerals and trace elements.

6. Utpalnaal contains vitamins, minerals, trace elements and various bioactive compounds having antioxidant and free radical scavenging activities along with major dietary constituents (Carbohydrate, proteins, fats).

7. Bisa and *Mrunal* have also been reported to contain vitamins, minerals and trace elements.

8. Shaluk contains all the major dietary components along with variety of minerals.

9. Kasheruk has been reported to contain some alkaloids along with major dietary components.

10. Shringatak is a rich source of Vitamin-A, C, E, B-Complex, minerals and trace elements along with major dietary components.

11. Kumuda also contains various inorganic elements along with major dietary components.

12. Shatavari has been reported to contain various bioactive compounds like ferulic acid, rutin etc. along with major dietary components.

13. Varahi Kanda has been reported to contain Carotene, Thiamine, Nicotine and various vitamins along with trace elements and major dietary components.

14. Maan Kanda contain Ascorbic acid, α-tocopherol along with various minerals, trace elements and major dietary components.

15. Various other members of *Kanda Shak Varga* like *Palandu*, *Rason*, *Mulak*, *Suran*, *Grinjanak*, *Bhukand* and *Shati,* all have been reported to contain all the major dietary components.

They also contain various biologically active molecules, precursors of various biomolecules, dietary fibres, vitamins, minerals and trace elements. Various minerals and trace elements have been reported to facilitate bio-transformation reactions as catalysts.

Though, some *Kanda Shak* described in classical texts like *Taruta* (*Dioscorea bellophylla* Voight.), *Raktaluk*, *Kashthaluk*, *Hastaluk*, *Madvaluk,*

All have been recognised as some species of Dioscorea is referred to as *Aaluk* by *Acharya* Charak and considered to be worst among *Kanda* which clearly reflects that regular use of *Aaluk* as a dietary constituent should be avoided, due to their *Dosha* aggravating properties.

Some species of Dioscorea have been reported to contain hydrocyanic acid (HCN) which is considered to down regulate various biotransformation reactions in the body.

Conclusion

From the present review it may concluded that tubers grouped under *Shak* are a rich source of all essential components required for normal functioning of human body. Tubers like *Vidari Kanda*, *Munjataka* various types of *Aaluk*, various varieties and components of *Kamal*, *Kasherak*, *Shringatak*, *Shatavari*, *Palandu*, *Rason*, *Mulak*, *Grinjanak*, *Suran* and *Shati* have also been described as potential classical drugs having diversified pharmacological properties and therapeutic potential. Various members of group of *Kanda Shak* have not been satisfactorily appropriated with their botanical sources and various others are lesser explored. Thus, *Kanda Shak* having established botanical identity, therapeutic and nutraceutical potential must be considered for wider utility for the elimination of malnutrition. There appears a need of further exploration of lesser known and unexplored varieties of *Kanda Shak*.

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