

## UTILIZATION OF MEDICINAL PLANTS FOR FOOD, FEED AND FODDER FOR ANIMALS-A REVIEW

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### SUMMARY

There is urgent need to increasing the food, feed and fodder production in India to satisfy the hunger of domestic animals. Moreover, the problems related to nutrient deficiency and health is increasing day by day. In addition to this, excessive exploitation of some important medicinal plants from their natural habitat have been reduced their status up to the endangered plants. Therefore, the cultivation of medicinal plants for food, feed and fodder is an urgent need in different agro-climatic regions of India as per their suitability to climatic conditions. Therefore, it becomes more import to discuss the various medicinal crop related for crop diversification as well as to improve the health of livestock as well as to increase the availability of quality animal products. Diversification through medicinal improves the cropping systems, utilization of waste/marginal lands, organic farming, quality of end products, soil health, ecological environmental and economics of cultivation system. The southern Haryana is suitable for cultivation of Asalio/chandersur, kasni, satawari, bakala, aloevera, alsil/linseed, methi neem, bakin, artemesia etc. These crop were found suitable for utilization as food, feed, fodder for domestic animals. The feeding of domestic animal on such crop in addition to other fodder crops improves the performance as well as health status of animals. In addition to this, feeding the animals on such plants also improves the quality of animal product.

**Key words :** Utilization, medicinal plants, health, food, feed, fodder, quality

India supports about 20% of the world's livestock and human population with only 2.3% of the world geographical area. India is leader in cattle (16%) and buffalo (55%). The deficiency in feed and fodder has been identified as one of the major constraints in achieving desired level of livestock production (Bikas *et al.*, 2013). Dependence of livestock for livelihood is obligatory nature of the Indian rural people. India is the world's largest milk (165.4 million tons) and fifth largest meat (6.3 million tons) producer owing to its per se contributes 4.5% GDP and 17.5% of total Agriculture GDP (National Accounts Statistics, 2016). Only 4% of the total cultivated area is under fodder cultivation. Most of the fodder demand is meet out by crop residues, forests, pastures and grazing lands. According of IGRFI Vision 2050, there is a net deficit of 61.1% green fodder, 21.9% dry crop residues and 64% feeds (Kumar *et al.*, 2018).

Traditionally, developing countries have been dependent on products derived from forest plants, for curing human beings and livestock ailments. About 12.5% of the 422000 plants species documented worldwide are reported to have medicinal value; but only a few hundred are known to be cultivated. Since the medicinal important resources in

the natural forests has considerably diminished during recent years because continuous increasing demands of the rare medicinal value plant stock. The growing demand for MAPs makes them remunerative alternate crops to the traditional ones for marginal farmers. Suitable model for intercropping of medicinal plants need to be developed with forest/horticulture and agricultural crops to optimize the production per unit area which help farmers in adopting commercial cultivation of medicinal and aromatic plants in a sustainable manner (Bimlendra and Nandal, 2010).

In early days, generally the livestock animals were brought to nearby grass land and forest area for grazing. During grazing the grass, they also in take the wild medicinal plants naturally grown there e.g. tumba, karela, shankhpuspi, dronpuspi, ashawagandha, neem, ak, marva tulsi etc., this grazing on medicinally important plants keeps the livestock animals free from common diseases. Now-a-days, grass land and forest areas are not left for open grassing the livestock animals. Thus, forage crops have served as a source of feed of domestic animals and cultivated to produce high yields of feed/fodder, which are also rich in nutrients suitable for animal's requirements (Kumar *et al.*, 2017).

Moreover, green fodder production is insufficient in the country and generally, the animals' feeds on dry straw which causes the health problems in animals. Therefore, the need is felt to feed our domestic livestock animals on medicinal plants to keep them healthy and free from common diseases. Plants (whole plants, leaves or seeds, mainly used as feedstuffs) and their extracts (considered as additives) are being increasingly used in animal nutrition as appetizers, digestive and physiological stimulants, colorants, and antioxidants, and for the prevention and treatment of certain pathological conditions. The digestive effects of herbs and spices have been tested primarily in humans and laboratory animals, and few trials have been performed on farm animals (Zotte *et al.*, 2016). Keeping the above discussion in view some medicinal plants having the food, feed and fodder value are discussed here:

**Asalio (*Lepidium sativum*)** : The green plants of asalio are used as green fodder for feeding to animals. Asalio seeds are utilized as feed ingredient for poultry to achieve faster growth and weight gain in poultry birds (Arya and Vandana, 2018). In milking animals, asalio seed also increases the milk production (Tyagi, 2008). It is added to soups, sandwiches and salads for its tangy flavor.<sup>[7]</sup>It is also eaten as sprouts, and the fresh or dried seed pods can be used as a peppery seasoning (*haloon*). This *herb* is the best source of *iron* and is hence recommended in the treatment of *iron*-deficiency anemia. It is also rich in folate, *calcium*, ascorbic acid, tocopherol, and beta-carotene. The *oil* derived from asalio seeds is edible and can therefore be used as a *cooking* medium.

**Shatavari (*Asparagus racemosus*)** : It is a popular supplement that people as well as animals use to treat a wide range of symptoms. It can be taken orally as a tablet, a powder, or liquid essence. The root of satawari after cutting into small pieces, it is generally feed to lactating animals for increasing milk production. It also removes blockage in teats, if any. Antioxidants protect the body from harm caused by free radicals, which can damage cells and lead to the development of diseases, including cancer. Antioxidants also fight against oxidative stress, another cause of disease. Perhaps the most common traditional use of shatavari, is to treat female health conditions, specifically reproductive disorders (Zotte *et al.* 2016).

**Kasni/Chicory (*Cichorium intybus*)** : It is rich in iron and dietary fibres. It controls the hunger pangs by

regulating the amino acid call Ghrelin. It prevents overeating and promotes the feeling of fullness in the stomach. The presence of antioxidant ant antitumor agents heps chicory to fight cancer. The laxative property of chicory alleviates the symptom of constipation. The anti-inflammatory action reduces the pain associated with arthritis. It is beneficial in conditions like muscular pains and sore joints (Tyagi, 2008). The laxative property of chicory/kasni leaves make it an excellent green fodder for feeding animals.

**Tumba (*Citrullus colocynthis*)** : It is a medicinal plant, it generally grow in wild state on sandy soils during the rainy season. It belongs to cucurbitaceous family. Generally, it is utilized to feed the cattle, camel and goat. It corrects the gastric disturbances in domestic animals. In human being, it is used to treat constipation, oedema, bacterial infections, cancer and diabetes (Dusyant and Deen, 2010). Therefore, the feeding of domestic animals (cattle, camel and goat) on tumba always remains helpful to keep away the gastric disturbances.

**Senna (*Cassia senna*)** : is mainly used as laxative. It's leaves and pods have senocide chemicals. It's leaves are mainly utilized to cure the gastric disturbances in animals. It also acts as growth promoter reported by Zotte *et al.*, (2016). In human being, it is used for curing asthma, fever, indigestion, anemia etc. The laxative property of *Cassia senna* leaves make it an excellent green fodder for feeding animals in semi-arid regions, therefore, the feeding of domestic animals always remains helpful to cure the gastric disturbances in animals.

**Ashawangadha (*Withania somnifera*)** : The plants of Ashawangadha are generally lush green and may be utilized for feeding animals. It empowers female fertility and after delivery it increases lactation in animals. It enhances the body power, reduces weakness and increase body weight. In human beings, it is used in headache, development of nervous system, heart problems, anesthesia, blood pressure and reduce cholesterol level (Tyagi, 2008).

**Guarpatha (*Aloe vera*)** : It contains about 200 active ingredients including vitamins, minerals, amino acids and enzymes to help promote good all round maintenance. *Aloe vera* is an antioxidant to protect against free radicals. In large numbers these highly-charged molecular fragments can weaken the immune system which fights infection and resists degenerative

changes (Tyagi, 2008). Viral infections, stress, pollution or simply growing older are all triggers. *Aloe vera* contains naturally occurring antioxidants in the form of vitamins B complex, C and E. plus beta-carotene which the body converts into vitamin A. Other nutrients include K, Ca, Mg, Zn, Mn, Cr and Na which are all essential for maintaining a healthy metabolism. It is well known that Aloe can help with gut problems, helping the bowel lining to regenerate and improve immune response. Goats can feed easily on *Aloe vera*. And other pet animal may feed on juice.

**Methi/fenugreek (*Trigonella foenum-graecum* L) :** The effect of feeding fenugreek seed at 20% of diet dry matter on dairy milking cow performance and milk characteristics was studied. Feeding fenugreek seed improved profile of functional fatty acids ( $P < 0.05$ ) in the milk, reduced blood cholesterol concentration (by 4% units more than the control diet) and produced lower concentrations in milk (1.48 vs. 1.83 mg/g milk lipid) in a three week study with dairy cows, without altering milk flavour or taste. Therefore, fenugreek seed could be used in dairy cow rations to improve milk quality. (Shah and Mir, 2004). Fenugreek is a traditional herbal medicine; it is used in treatment of diabetes. It is also recommended as alternative forage in alfalfa based cattle farms since it can prevent bloating in cattle. It is also reported to provide similar rumen conditions, digestibility and weight gain in cattle in comparison to alfalfa (Kumar *et al.*, 2013).

**Tulsi (*Ocimum tunuiflorum*) :** The leaves of *Ocimum tunuiflorum* suppressed benzo pyrene induced chromosomal aberrations in the bone marrow and elevated glutathione (GSH) and glutathione-S-transferase (GST) activities in liver of mice. The suppressing effect of *Ocimum* on chemically induced hepatomas in rat and tumors in the fore-stomach of mice was reported by Samresh *et al.* (2003). The flavonoids are also found in *Ocimum* leaf extract, therefore, feeding of animals on flavonoids diet has a preventive effect on cancer, coronary heart disease and strokes. Thus, *Ocimum* is useful in developing cancer preventive drugs.

**Neem (*Azadirachta indica*) :** The mixing of neem leaves powder in animal feed has increased the total feed intake by 5.7%. Neem leaves acts as a growth promoter by killing parasites that hinder the growth of animals. Kudke *et al.* (1999) reported that upto 10% neem cake may be included in concentrate for cattle and upto 5% for poultry. It have at least 35 biologically

active principles (Mulla, 1999). Azadirachtin is the predominant insecticidal active ingredient in the seed, leaves and other parts of neem tree. These compounds exhibit various modes of action against insects such as growth regulator, anti-feedancy, fecundity suppression and sterilization, oviposition repellency or attractancy, changes in biological fitness and blocking fitness and blocking development of vector-borne pathogens. Neem ingredients acts as a repellent by disrupting the appetite of insects and diminishing their urge to reproduce (Tipu *et al.*, 2006).

**Bakin (*Melia azadarach*) :** The green leaves of bakin to be utilized to feed goats and sheep in rural areas. Hayat *et al.* (1996) studied prophylactic effects of the indigenous preparation of bakin with the salinomycin against coccidiosis in broiler chicks. It was reported that the addition of salinomycin and bakin in the diet of poultry birds had markedly reduced the number of oocysts per gram of faces (Tipu *et al.*, 2006).

**Artemesia (*Artemesia annua*) :** The feeding of dried leaves *Artemesia annua* and its components to poultry birds at a dose of rate of 1% for 5 weeks prior to infection with *Eimeria acervulina*, *E. maxima* or *E. tennela*, provides significant protection to poultry birds. Artemesia have artemisinin which protected weight gains and reduces oocyst yields for both, *Eimeria acervulina*, *E. maxima* or *E. tennela* (Allen *et al.*, 1997).

**Sea Buck Thorn :** The leaves and fruits of Sea buck thorn are rich source of protein, vitamin and minerals. It is a favorite fodder and feed for high altitude animals such as double – humped camel, pashmina goats, sheep, yaks and donkeys. Sea buck thorn oil has general nourishing, revitalizing and restorative actions. Skin problems such as acne, dermatitis, irritated itching skin, skin soreness, ulcers, burns, scalds, cuts and tissue regeneration are also effectively treated with it.

Kuthale *et al.* (2017) studied the nutritional status of 14 plant species for fodder purposes. They reported that being legume *Stylosantes hamata* exhibited higher protein (10.17%). The highest ether extract (1.01%) in *Apluda mutica*, highest ash content (11.55%) in *Chrysopogon fulvus* and highest silica content (10.47%) was found in *Cympogon martini*. Generally, the grasses are dominant in most forage based enterprises throughout world which are the basis of energy and nutrients for animal growth and maintenance (Trlica, 2017). The level of crude protein, the essential amino acids and metabolisable energy in

the recipes for livestock and poultry depends on the breed, genetic material, nutrition and maintenance technique (Caisin, 2010).

The dietary inclusion of *Foeniculum vulgare* Mill. seeds with oregano leaves has been observed to improve diet utilisation, whereas the dietary inclusion of a mixture of *Lupinus albus* L., *Trigonella foenum-graecum* L., and *Cassia senna* L. has acted as growth promoter. Antimicrobial effects are derived especially from plant volatile oils. In the rabbit, a stabilizing effect on microbiota was observed when the diet was supplemented with thyme oil. When diets were supplemented with thyme leaves and spirulina algae, an antimicrobial effect on *Clostridium coccoides*, *Clostridium leptum* in the caecum was observed. Black cumin seeds have been shown to exert anti-inflammatory, antibacterial and immunomodulatory effects. Several herbs and spices (green tea, rooibos, oregano, rosemary and thyme) provide antioxidant effects through rabbit dietary supplementation or inclusion in meat and meat products (Zotte *et al.*, 2016).

In poultry, mixtures of essential oils of cinnamon, oregano, thyme, cayenne pepper, citrus (Lippens *et al.*, 2005) improved feed conversion ratio. An essential oil combination derived from herbs growing wild in Turkey was found to have a beneficial effect on body weight, feed intake, feed conversion ratio, and carcass yield when used as a feed additive for broiler chickens (Alcicek *et al.*, 2004).

Milk production is a complex physiologic process involving physical factors and the interaction of multiple hormones. Galactagogues are medications or other substances believed to assist with initiation, maintenance or increase of milk production (Bharti *et al.*, 2012). Although, many plant preparations, such as *Leptadenia reticulata*, satari, ashawagandha, *Arundo donax*, *Cissampelos pareira*, and *Foeniculum vulgare*, and extracts of *Eclipta alba* and *Solanum nigrum* have been incorporated in polyherbal formulations/tablets like Galog (Indian herbs), Ruchamax (Ayurved), Payapro (Ayurved), Leptaden (Alarsin vet), Calshakti Platina, Ricalex and Lactara (TTK Pharma) have been used around the world for their alleged galactagogue properties, the specificity and power of the galactopoietic effect of the individual plants still remain to be validated (Behera *et al.*, 2013).

Among the natural products tested in farm animals, only a few have been shown to increase milk production including fenugreek seed (Shah and Mir, 2004) and Silymarin, a standardized extract from seeds of milk thistle (*Silybum marianum* L.) in dairy cows

(Tedesco *et al.*, 2004), and fenugreek seeds (Alamer and Basiouni, 2005), galega and pea seeds (Spruzs and Selegovska, 2010) in goats. Recently, satawari has been shown to possess a lactogenic effect in dairy cows (Behera *et al.*, 2013) in support of previous results with cows and buffaloes (Singh *et al.*, 2012).

## CONCLUSIONS

The cultivation of medicinal and aromatic plants will improve the cropping systems, and ultimately improve the fertility status of field. The utilization of waste land, marginal lands, and problematic soils for cultivation of medicinal and aromatic plants for feeding them to livestock animals through organic farming will increase the quality of end products, soil health, ecological environmental and economics of cultivation system. Asalio/chandersur, kasni, satawari, bakala, aloe vera, linseed, methi, tumba, senna, neem, bakin, artemesia etc. were found suitable for utilization as food, feed, fodder for domestic animals. The feeding of domestic animal on such crop in addition to other fodder crops will improve the performance as well as health status of animals and keep them free from major disease. In addition to this, feeding the animals on medicinal plants also improves the quality of animal products such as milk, meat and egg, but further research is recommended to optimize effects on animals.

## REFERENCES

- Alamer, M.A. and G.F. Basiouni, 2005: Feeding effects of fenugreek seeds (*Trigonella foenum-graecum* L.) on lactation performance some plasma constituents and growth hormone level in goat. *Pak. J. Biol. Sci.* **8**: 1553-1556.
- Alcicek, A., M. Bozkurt and M. Cabuk, 2004: The effect of a mixture of herbal essential oils, an organic acid or a probiotic on broiler performance. *S. Afr. J. Anim. Sci.* **34**: 217-222.
- Alemu, A. W., L. Doepel, 2011: Fenugreek (*Trigonella foenum-graecum* L.) as alternative forage for dairy cows. *Animal Sc.*, **5** : 1370-1381.
- Allen, P. C., J. Iydon and H. D. Danforth. 1997: Effects of components of *Artemisia annua* on coccidian infections in chicken. *Poultry Sci.*, **76**: 1156-1163.
- Arya, R.K. and Vandana 2018: Evaluation of chandersur genotypes under Haryana conditions. *Forage Res.* **44** : 213-215.
- Behera, P.C., D.P. Tripathy and S.C. Parija, 2013: Shavatari: potentials for galactagogue in dairy cows. *Indian J. Tradit. Knowl.* **12**: 9-17.
- Bharti, S., N. Sharme, A. Gupta, K. Murari and A. Kumar,

- 2012: Review: pharmacological actions and potential uses of diverse Galactagogues in cattle. *Int. J. Pharm.* **2**: 1-5.
- Bimlendra and D.P.S. Nandal, 2010 : Cultivation of medicinal plants in Agro-forestry: a better option for farmers. In: workshop on 'Emerging chalanges: Medicinal and Aromatic plants', March 26-27, 2010, CCS HAU, Hisar. pp128.
- Bikash, A., I. S., Yadav and R. K. Arya. 2013 : Evaluation of hybrids for dry fodder yield stability in pearl millet. *Forage Res.* **39** : 16-19.
- Caisin, L. 2010: *Animal Nutrition*. Foxtrot SRL, Chisinau.
- Dusyant and M.K. Deen, 2010 : Chemical constituents of the sed of Tumba (*Citrullus clocynthis*). In: workshop on 'Emerging chalanges: Medicinal and Aromatic plants', March 26-27, 2010, CCS HAU, Hisar Pp133.
- Hayat, B., F. Jabeen, C. S. Hayat and M. Akhtar, 1996: Comparative prophylactic effects of alinomycin and some indigemous preparations against coccidiosis in broiler chicks. *Pakistan Vet. J.* **16**(4): 164-167.
- IGFRI Vision 2050 : Indian Grassland and Fodder Research Institute, Jhansi, U. P., India.
- Kauthale, V., S. Kulkarni and A. Nalawade, 2017: Nutritional evaluation of selected fodder species from Warhda district of Mahrastra, India. *Forage Res.* **43**: 247-249.
- Kudke, R. J., S. R. Kalaskar and R. V. Nimbalkar, 1999: Neem leaves as feed supplements for livestock. *Pushudhn*, **14**: 12.
- Kumar, M., M. Parshad and R.K. Arya, 2013: Grain yield and quality improvement in fenugreek- a review. *Forage Res.* **39**: 1-9.
- Kumar, N., M. Rana and S. Ahmed, 2018 : Indian Forage Breeding : Present status and Future Strategies. In : Fodder Crops-Approaches for Value Addition of Enhancing Income (Eds. Y. Jindal, A. K. Chabra and A. K. Roy) AICRP on Forage Crops IGFRI, Jhansi. pp. 1-12.
- Kumar, S., H. Lakhran, R.S. Meena and C.K. Jangir, 2018: Current needs of sustainable and forage production to eliminate food and forage insecurity under climate change era. *Forage Res.*, **43**: 165-173.
- Lippens, M., G. Huyghebaert and E. Cerchiari, 2005: Effect of the use of coated plant extracts and organic acids as alternatives for antimicrobial growth promoters on the performance of broiler chickens. *Eur. Poult. Sci.* **6**: 48-56.
- Livestock Censuses. 2012 : Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture & Farmers' Welfare, GOI.
- Mulla, M. S. 1999 : Activity and biological effects of neem products against arthropods of medical and veterinary importance. *J. Amer. Mosq. Cont. Assoc.*, **15** : 133-152.
- National Accounts Statistics. 2016 : Central Statistical Organization, GOI.
- Samresh, D., A. Srivastava, V. Singh and A. Sharma, 2003: An overview of Ocimum chemistry and pharmacological profile. *Hamdard Medicus*, **46**: 43.
- Shah M. A. and P. S. Mir, 2004: Effect of dietary fenugreek seed on dairy cow performance and milk characteristics. *Canadian Journal of Animal Science*, **84**: 725-729.
- Singh, S.P., Mehla, R.K., Singh, M., 2012: Plasma hormones, metabolites, milk production, and cholesterol levels in Murrah buffaloes fed with *Asparagus racemosus* in transition and postpartum period. *Trop. Anim. Health Prod.* **44**: 1827-1832.
- Spruzs, J. and E. Selegovska, 2010: Effect of galega and pea seeds on goat milk production and quality indices. *Anim. Nutr. Feed Technol.*, 2010 : 70-75.
- Tedesco, D., A. Tava, S. Galletti, M. Tamen, G. Varisco, A. Costa and S. Steidler, 2004: Effect of Silymarin, a natural hepatoprotector in periparturient dairy cows. *J. Dairy Sci.* **87** : 2239-2247.
- Tipu, M. A., M. S. Akhtar, M. L. Anjum and L. Raja. 2006: New dimension of medicinal plants as animal feed. *Pakistan Vet. J.* **26**: 144-148.
- Trlica, M.J. 2017: Grass Growth and Response to Grazing (Internet, January 2017) Available from : [http://drought.unl.edu/portals/2/documents/droughtbasics/plantgrowth\\_quick\\_facts.pdf](http://drought.unl.edu/portals/2/documents/droughtbasics/plantgrowth_quick_facts.pdf).
- Tyagi, C.S. 2008: Package & practice of medicinal and aromatic plants. MAP Section, Department of Genetics & Plant Breeding, CCS HAU, Hisar.
- Zotte, A. Dalle, C. Celia and Zs. Szendr?, 2016: Herbs and spices inclusion as feedstuff or additive in growing rabbit diets and as additive in rabbit meat: A review. *Livestock Sci.* **189** : 82-90