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Unveiling the Marvels of Cow Urine: Nature's Gift and Modern Application

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Traditional methods and natural medicines have seen a return in several industries in recent years and one such ancient technique gaining appeal in agriculture is the use of cow urine. It is reported that cow urine is a miraculous panacea that capable of altering farming practices and increasing crop production. The indiscriminate use of agrochemicals since the revaluations has had a negative impact on soil fertility, crop productivity, produce quality, and more precisely, on the environmental system. Cow urine provides numerous benefits to crops, soil health, and the environment, making it an appealing alternative to chemical fertilizers and pesticides. The integrated use of chemical and organic sources of nutrients in crop production is becoming increasingly important for ensuring long-term food security, which not only improves soil fertility for sustained crop productivity but also lowers the cost of inorganic fertilizers. Organic materials such as FYM, animal manures, crop residues, composts, cow urine, and so on have been utilized in crops, but the amount and availability of nutrients in organic materials varies greatly. Livestock wealth is thought to be humanity's oldest wealth resource. Cow symbolizes the Vedic principles of selflessness, service, strength, dignity, and nonviolence. In Indian civilization, the cow holds the highest position of honor. Cow products (urine, dung, ghee, milk, and curd) are employed in a variety of organic systems. Cow urine has been used for a long time in India. Cow urine has been described as a liquid with numerous therapeutic properties, capable of healing a variety of incurable ailments in humans and plants. Cow urine has been thought to be particularly effective in agricultural operations as a bio fertilizer and bio insecticide (Dharma *et al.*, 2005).

Why cow urine becoming so popular in agriculture?

It is a rich source of macronutrients and micronutrients, as well as having antiseptic and preventive qualities, which help to purify the atmosphere and promote soil fertility. As a result, cow urine could be a useful technique for addressing multi nutrient deficits in the majority of the country's soils. It is believed to deliver nutrients to plants at a low cost, making it a viable option for plant nutrition, metabolic stimulation, and pest and disease management. Among various organic sources cow urine contains sulphur, phosphate, potassium, sodium, manganese, carbolic acid, iron, silicon, chlorine, salt, enzymes, and hormones in addition to nitrogen. Cow urine is not a harmful effluent because it contains

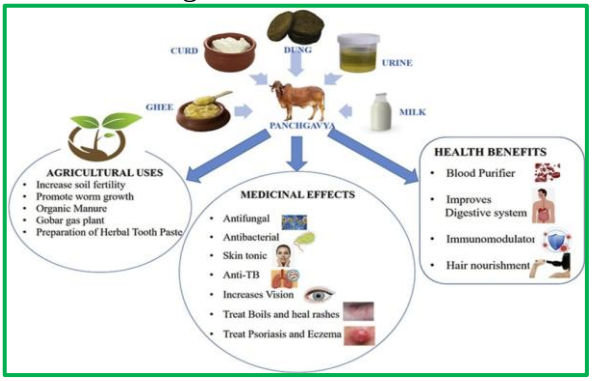

Fig: Panchagavya

95% water, 2.5% urea, and the remaining 2.5% a mixture of minerals, salts, hormones, and enzymes. It is also a natural disinfectant and pest repellant, and it is the major ingredient in Panchagavya, an organic crop booster made and sprayed by Indian farmers. As a byproduct of ecological sanitation, cow urine is well suited for use as fertilizer since it contains critical nutrients for plant growth.

Uses of cow urine in agriculture

Cow urine has been reported to be a plant growth enhancer and is commonly utilized as a bio fertilizer for various crop plants. Cow urine can improve plant resistance against a wide range of plant pathogens such as mycoplasma, viruses, bacteria, fungus, nematodes, and insects that cause diseases and damage to cultivated plants. Along with various essential nutrients cow urine also contains bioactive compounds like urea, uric acid, and enzymes that play vital roles in plant growth and soil fertility. These nutrients are believed to be released gradually, providing a steady supply of nourishment to plants. The nurturing impact of these compounds on beneficial soil bacteria increases their activity, resulting in enhanced plant development and agricultural yield. Urine can be used as a fertilizer in gardening and agriculture.

The Historical Roots of Cow Urine in Agriculture

Cow urine has been used as an agricultural input since ancient Indian scriptures such as the Vedas where it was praised for its medicinal and agricultural benefits. Ayurveda, the traditional system of medicine, also praised cow urine as a rich source of nutrients and enzymes. Cow urine hold a special place in Ayurveda, where it is described in the 'Sushruta Samhita' and 'Astanga Sangraha' as the most effective substance of animal origin with infinite benefits. It has been identified as the water of life or "Amrita" (beverage of immortality), the nectar of God.

Cow urine in organic agriculture

Cow urine is an indispensible component in organic and natural farming. It is used in preparing different nutrient solutions like *Beejamrutha, Jeevamrutha, Panchgavya, Sanjivak* etc. One of the most important aspects of cow urine is its ability to act as a natural pesticide and fungicide. Several studies suggest that the organic compounds present in cow urine can repel insects, pests, and even inhibit the growth of harmful fungi, reducing the need for chemical interventions. It is used in preparation of different pest control formulations like *Dashparni extract, Neemastra, Brahmastra, Agniastra* etc.

1. ***Beejamrutha:*** *Beejamrutha* is a fermented microbial solution that contains a high concentration of plant-beneficial microorganisms and is used as a seed treatment. Beneficial microorganisms are expected to colonize the roots and leaves of sprouting seeds and aid in the healthy growth of the plants.

Materials required: 5 kg cow dung, 5 litre cow urine, 50 gram lime, 50g virgin forest soil, 20 litre water (for 100 kg seed)

Preparation steps: Take 5 kg fresh cow dung in a cloth bag and suspend the bag in a container filled with water for 12 hours.

- Simultaneously, in another container take 1 litre water and add 50g lime in it.
- Next morning, continuously squeeze the bag in the water so that all essence of cow dung is mixed with the water.
- In that water add 5 litre cow urine, 50g virgin forest soil, lime water and 20 litre water and stir it well.
- Incubate the solution for 8-12 hours and

Fig: *Beejamrutha* preparation

filter the contents. Then filtrate is ready for seed treatment.

2. ***Jeevamrutha:*** Jeevamrutha acts as a biostimulant by stimulating the activity of soil microorganisms as well as phyllospheric microorganisms when applied to plants.

Materials required: 10 kg of fresh cow dung, 10 litre cow urine, 2 kg jaggery, 2 kg pulses' flour, 1 kg uncontaminated soil and 200 litres water (for 1 acre land)

Fig: *Jeevamrutha* preparation

Preparation steps: In 200 litre water mix 10 kg cow dung, 10 litre cow urine, 2kg jiggery, 2kg pulse flour and 1kg uncontaminated soil. Ferment the solution for 5-7 days and stir the solution regularly thrice a day and use it for 1 acre land with irrigation water.

3. ***Sanjivak:*** *Sanjivak* is used for enriching the soil with microorganisms and quick decomposition of residues.

Materials required: 100kg cow dung, 100 litre cow urine, 500gm jaggery and 300 litre water.

Preparation steps: In a 500 litre closed drum, take 300 litre of water and mix 100kg cow dung, 100 litre cow urine, 500gm jiggery and ferment it for 5-7 days. Dilute the solution with 20 times water and used it either as soil spray or mixed with irrigation water in 1 acre land.

4. ***Panchgavya:*** *Panchagavya*, a specific preparation prepared from five cow by-products and other components, it has the potential to promote development and provide immunity in plant systems.

Materials required: Cow dung 5 kg, cow urine 3 lit, cow milk 2 lit, curd 2 lit, cow butter oil 1 kg (for 1 acre land)

Preparation steps: In a container mix the entire ingredient and ferment the solution for 7 days and stir it two times a day. Then dilute 3 litre of panchgavya in 100 litre water and spray over the soil or use it along with irrigation water.

5. ***Neemastra:*** Take 5 kg neem leaves and crushed it in water and add 5lit cow urine and 2kg cow dung in it. Then ferment it for 24 hours with intermittent stirring. Then filter squeeze the extract and dilute it to 100lit. 100lit solution is sufficient for one acre land. It is effective against sucking pest and mealy bug. It can be used as foliar spray.

6. ***Brahmastra:***
   - Crush 3 kg neem leaves in 10 lit cow urine.
   - Crush 2 kg custard apple leaf, 2 kg papaya leaf, 2kg pomegranate leaves, 2 kg guava leaves in water.
   - Mix the two and boil 5 times at some interval till it become half
   - Keep it for 24 hrs and then filter squeeze the extract.
   - Dilute 2-2.5 lit of this extract to 100 lit for 1 acre land.

This can be stored for 6 months. It is effective against sucking pest and pod/fruit borer.

7. ***Agniastra:***

- Crush 1 kg Ipomea (besharam) leaves, 500 gm hot chilli, 500gm garlic and 5 kg neem leaves in 10 lit cow urine.
- Boil the suspension 5 times till it becomes half.
- Filter squeeze the extract.
- Dilute 2-3 lit extract to 100 lit for used in one acre.

It is effective against leaf roller and stem/pod/fruit borer.

Impacts of cow urine in agriculture

1. **Growth parameters:** It is reported that different aspects of growth are accelerated by the application of cow urine in several crops such as Maize; Rice; Mustard; Lettuce (Devakumar *et al.*, 2014; Pradhan *et al.*, 2016; Oliveira *et al.*, 2009; Qibtiyah *et al.*, 2015, respectively).

The higher the cow urine concentration, the higher the performance of all phenotypic characteristics of methi and bhindi, including plant height, shoot length, root length, number of leaves, length and breadth were increased compared to control (Jandaik *et al.*, 2015).

2. **Plant nutrient content:** It is reported that the protein and chlorophyll levels in crops increased with an increased urine concentration compared to control (Jandaik *et al.*, 2015).
3. **Soil physical and chemical properties:** It is reported that with the application of FYM 12.5 t/ha+cattle urine at 34300 l/ha increases soil organic carbon (0.58%), available nitrogen (272.4 kg/ha), phosphorus (23.5 kg/ha) and potassium (199.9 kg/ha) as compared to control (Veeresha *et al.*, 2014).
4. **Microbial population of soil:** It is reported that when FYM 12.5 t/ha+ cattle urine at 34300 l/ha was applied, the soil microbial population was much greater, including bacteria (47.0 105 cfu/g), fungus (34.6104 cfu/g), and actinomycetes (40.0103 cfu/g) (Veeresha *et al.*, 2014).
5. **Post harvest parameters:** Cow urine at 5 and 10% concentrations considerably enhanced all post-harvest characteristics of gladiolus, including percent opened flower in vase, basal floret diameter, shelf life, and vase life of cut spikes, as compared to controls (Tamaraker *et al.*, 2016).

Conclusion

Declining soil fertility and productivity due to indiscriminate use of chemical fertilizer and pesticide is a major drawback of green revolution technology. To produce sufficient food for the ever-increasing population in limited land resources, it is a high time that we should give emphasis on sustainable agriculture. Cow urine products are effective tools for improving soil physical, chemical and biological properties and to increase crop yield per unit land by improving nutrient availability to crop and controlling harmful insect and pest. So, emphasis should be given to use of cow urine products in agriculture as it is eco-friendly, economically viable and easily available.

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