AGRICULTURE & FOOD: E-NEWSLETTER
WWW.AGRIFOODMAGAZINE.CO.IN
E-ISSN: 2581 - 8317

# Cow Based Bioformulations for Pest Management

**Article ID: 36625**

**Aditi Badiyala[1], G.D. Sharma[2], Dhanbir Singh[3]**

[1]Research Associate, Department of Organic Agriculture and Natural Farming, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, Himachal Pradesh, 176 062, India.

[2]Professor, Department of Agronomy, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, Himachal Pradesh, 176 062, India.

[3]Assistant Soil Chemist, Department of Soil Science, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, Himachal Pradesh, 176 062, India.

The tribulations created by the imprudent use of chemical insecticides calls for developing cost effective, environment friendly and safe pest control approaches to reduce the harm to ecosystem as a whole. Historically, organic wastes of animal origin were most commonly used for nutrition and plant protection, besides the herbs processed in liquid excreta of animals. Various workers have revealed that fortification of cow urine and/or cow dung with leaf extracts of various botanicals like neem, *Ipomoea*, *Annona*, *Melia*, *Lantana*, jatropha etc resulted in increased insecticidal property against various pests of crops and higher yields. Such formulations have proved eco-friendly substitute to hazardous pesticides. Therefore, we aim to discuss here few such cow based botanical formulations which can be used in pest management under organic/natural farming.

**1. Cow urine:** Cow urine is known for its strong repellant action against pests since ages and 10% of 15-day seasoned cow urine can be used as a protection to all crops in all the environments. The spray must be a mixture of 10 per cent cow urine and 90 per cent water. Cow urine is one of the best remedies to cure fungal and bacterial diseases. It has an excellent germicidal power, antibiotics and antimicrobial activity. Therefore, cow urine can kill varieties of germs and it also boosts immunity. Cow urine contains 95% water, 2.5% urea, and the remaining 2.5% is mixture of salts, hormones, enzymes, and minerals. Mixing of cow urine with extract/decoction of plant parts after soaking, boiling or fermenting in water; prove more effective than spraying of cow urine alone.

**2. Beejamrit:** A mixture containing 5 litres cow urine, 5 kg cow dung, burnt lime 250 g, 100 g soil around the tree and 20 litres of water. The seeds or planting material should be treated before sowing with 200ml beejamrita per kg seed. The seeds of selected crop are spread on a tarpaulin sheet and beejamrita is sprinkled on the seeds to coat them uniformly. The seeds are then dried in shade and sown the next day. In case of vegetatively propagating crops, the tubers/rhizomes/sets/grafts of selected crop are put in a bamboo basket and the basket is dipped in a tub containing beejamrita for 15-20 seconds Beejamrit treated plants show increased resistance against insect-pests and diseases throughout their growth period.

**3. Jeevamrit:** A solution containing cow urine 10 litres, cow dung 10 kg, live soil 1 kg, jaggery and gram flour each 2kg and 200 litres water. The solution should be kept for fermentation in shade for 5 -7 days while stirring intermittently and thereafter strained through the cloth and stored. The prepared solution should be used within 7 days. Drenching and spraying soil/transplants at 5 to 10% with this solution improve the soil beneficial fauna, fertigation and provide protection against pests. While applying jeevamrita, there should be enough moisture in the land.

**4. Panchagavya:** Panchagavya is an organic formulation, which in Sanskrit means the blend of five dissimilar products viz., milk, curd, ghee, urine and dung obtained from Desi cow (all these products are individually called as "Gavya" and jointly named as Panchagavya). Take 5 kg cow dung, then add 3 litres cow urine, 2 litres milk, 2 kg curd, and 1 kg desi ghee/clarified butter and mix well. Keep the mixture in a shady place and cover with a wire mesh or plastic mosquito net for fermentation in an airtight vessel for 10 to 15 days, while stirring every day. It offers excellent protection to different diseases and insect-pests of crops at 10% solution. It is also helpful as seed treatment or as drench in nursery and polyhouse.

**5. Fermented butter milk:** Is commonly known as lassi or chhachh. It is a known strong repellant, antifeedant and cures many of the plant diseases/disorders. Only 10-20 times diluted 15-20 days old solution should be used in crops/any environment to avoid phytotoxicity to tender leaves.

**6. Neemastra:** Boil 4 kg of crushed neem seeds/leaves/ chopped neem plant parts in almost equal amount of water till the contents reduce to half. Then add 2 litres of seasoned cow urine. The solution can be used after sieving and further diluting 15 to 20 times against wide variety of insect pests and diseases of crops. Its uses on crops provide the resistance to sucking insect-pests and caterpillars and increase the overall crop productivity due to the immune-stimulant stirring of the active principles in both the cow urine and neem leaf extract.

**7. Agneyastra:** Put the chopped leaves of Ipomoea 1 kg, *Melia azadarach* 5 kg in 10 litres cow urine. Add crushed half kg each of red chilli and garlic in the suspension. Boil the mixture till quantity remains half. Dilute 10 times before spray for use in the field against pests like stem borers, fruit borers, root borers and leaf folders that are hidden inside stems, fruits, roots and leaves of plants.

**8. Dashparni:** The word Dashparni contains two different words: 'Dasha' means 'ten' and 'parana' means the plant or tree leaf, meaning it constitutes leaves of 10 plants. Macerated leaves of plants viz. 400 g of *Melia azardarach,* 250 g of *Allium sativum* and 100g each of *Ipomoea carnea, Polygonum hydropiper, Juglan spp, Solanum nigrum, Lantana camara, Eupatorium adenophorum, Tagetes* spp and red chilli powder should be added in 2 litres of cow urine and 10 litres of water. Keep the solution for 10 days in a closed vessel. It is a known broad spectrum botanical insecticide with strong repellant and antifeedant action. It helps in developing immunity within plants and shows antiviral, antibacterial and antifungal properties. In Dashparni ark, the major components like alkaloids, steroid, tannin, coumarin, proteins, amino acids, flavonoid, phytosterol, phenol, glycosides, and carbohydrates are present, many of which show strong repellent activity. Its foliar applications have been reported to exert protection and strong repellence against sucking pests, pod/fruit borers, and some species of mosquitoes.

**9. Melia extract:** Add 5 kg chopped *Melia azadarach* leaves and 2 kg cow dung in 5 litres cow urine. Mix well and store for at least 3 days. Stir the solution properly, sieve and dilute with 100 litres of water. The suspension is ready for use in the field. It has proved effective at 5-10% sprays at weekly intervals against the sucking pests of crops.

**10. Lantana extract:** For preparing the extract, use 4 kg fresh leaves of *Lantana camara* in 12 litres of cow urine and equal amounts of water. After 15 days, sieve the solution which is ready for use as spray against crop pests. Dusting with dry powder mixed with 5 times of ash provides good results against defoliators.

**11. Ghaneeri extract:** Take 2 kg crushed leaves of *Polygonum hydropiper* and add in 4 litres each of cow urine and water. Keep the mixture in an air tight vessel for 15-20 days for fermentation, later strain and use as 10 % solution against soft bodied insects at weekly intervals. It has been reportedly found quite effective against mustard aphid, jassids and whiteflies under organic conditions.

**Table 1: Some experiments on insect-pest management through cow based bioformulations:**

| Sr. No | Bioformulation | Insect-pests managed | Crop | Place of study | Reference |
|---|---|---|---|---|---|
| | Neem Seed Kernel Extract 3% (in cow urine ) | Mustard aphid, *Lipaphis erysimi* | Mustard | Madhya Pradesh | Gupta (2005) |
| | Cow Urine + water (1:1) | Sucking bugs viz. *Aspavia armigera, Decticoides brevipennis, Clavigralla tomentosiccollis* | Amaranthus | Nigeria | Onunkun (2014) |
| | Agneyastra 5% | Brown plant hopper, *Nilaparvata lugens*, Whitebacked plant hopper, *Sogatella furcifera*, Leaf folder, *Cnaphalocrocis medinalis* | Paddy | Karnataka | Ravichandra et al. (2014) |

| | | | | | |
|---|---|---|---|---|---|
| | Brahmastra 20 % | Cotton aphid, *Aphis gossypii*, Cotton leafhopper, *Amrasca biguttula biguttula*, Thrips, *Thrips tabaci* and whitefly, Bemisia tabaci | Cotton | Gujarat | Patel et al. (2017) |
| | Panchagavya 3% + Cow Urine 3% | Ash weevil. Myllocerus and bean leaf roller, *Omoides diemensalis* | Soybean | Meghalaya | Das et al (2018). |
| | NSKE 5% and Neemastra 20% | Green leafhopper, *Empoasca flavescens* | Castor | Andhra Pradesh | Kumar and Sarada (2020) |
| | Darekastra 5% +Agneyastra 5% | Tobacco caterpillar, *Spodoptera litura* | Tomato | Himachal Pradesh | Badiyala and Kanwar (2021) |
| | Darekastra 10%, Jeevamrit 10% | Aphids, Aphis gossypii, leafhopper, *A. biguttula biguttula* | Okra | Himachal Pradesh | Kaushal et al. (2021) |
| | Darekastra 10% and Tamarlassi 10% | Two-spotted spider mite, *Tetranychus urticae* | Cucumber | Himachal Pradesh | Thakur and Sood (2022) |

The green bioformulations prepared by mixing either the cow dung or urine in distinct proportions with diverse botanicals, are being used by farmers and researchers as effective pest repellents in agriculture. Since nature has bestowed us with innumerable plant species, therefore, more research is needed in this direction to explore many such plants and to study their synergistic action with cow dung and cow urine so that more products can be developed to have enhanced efficacy against insect-pests infesting crops and at the same time obtaining residue free food.

## References

1. Badiyala, Aditi and Kanwar, Sangeeta. 2021. Eco-friendly management of *Spodoptera litura* on tomato grown in polyhouse under natural farming conditions. Sixth National Conference on Biological Control: Innovative Approaches for Green India held on 3 - 5 March 2021. ICAR-NBIAR, Bengaluru. p 126 (abstract).
2. Das A, Dey U, Baiswar P, Pande R, Ramakrushna GI, Layek J. 2018. Development of spray schedule involving commercial and indigenous biopesticides for insect pest and disease management in soybean crop. Innovative Farming 3(1):11-18.
3. Gupta M.P. 2005. Efficacy of neem in combination with cow urine against mustard aphid and its effect on coccinellid predators. Natural Product Radiance 4(2):102-106.
4. Kaushal, Shruti, Sharma P. K, Sharma, P C and Joshi, M.K. 2021. Efficacy of natural products on sucking pests of okra. Indian Journal of Entomology 83(2021) Online published Ref. No. e20157 DoI No.: 10.5958/0974-8172.2020.00219.9
5. Kumar, G. V. S. and Sarada, O. 2020. Evaluation of cow based fermented organic products for non-insecticidal pest management in castor. International Journal of Current Microbiology and Applied Sciences 9(10): 292-300.
6. Onunkun O. 2014. Field trials using cow urine and dung as biopesticides against sucking bugs of *Amaranthus cruentus*. International Journal of Research in Agricultural Sciences 1(3):167-171.
7. Patel, R. D.; Bharpoda, T. M.; Borad, P. K.; Bhatt, N. A. and Mahida, R. D. 2017. Efficacy of different bio-pesticides against sucking pests of Bt cotton. AGRES – An International e-Journal 6 (1): 171-180.
8. Ravichandra Y. P., Sreenivas, A. G., Prabhuraj, A. Hiremath, G. M., Rachappa, V. and Vendan. K. T. 2014. Management of insect-pests of paddy by organic approaches. Journal of Biological Control 28(3): 166-176.
9. Thakur, S. and Sood, A.K. 2022. Foliar application of natural products reduces population of two- spotted spider mite, *Tetranychus urticae* Koch on parthenocarpic cucumber (*Cucumis sativus* L.) under protected environment. Available at SSRN: https://ssrn.com/abstract=4012411 or http://dx.doi.org/10.2139/ssrn.4012411.