



A Monthly e Magazine
ISSN:2583-2212

Nov, 2023 3(11), 2891-2896

Popular Article

Kunapajala-an Indigenous Bio-input for Natural Farming

Ajay kumara K. M.*, Denisha Rajkhowa, Pavankumar Goudar, Senpon Ngomle, Rajib Das and Mahesh Kumar

College of Horticulture and Forestry, CAU (I), Pasighat, Arunachal Pradesh,
and College of Agriculture, CAU(I), Pasighat, Arunachal Pradesh

<https://doi.org/10.5281/zenodo.10141748>

Introduction

The *Kunapajala* (filthy fluid) or *Kunapambu* (fermented filth) is one of the traditional organic liquid formulations used since ages. *Kunapajala* was derived from Sanskrit words ‘*Kunapa*’ (smelling like dead body, corpse) and ‘*Jala*’ (water). Earliest record of this organic formulation was found possibly in two documents *i.e.* ‘*Vrikshayurveda*’ (Surapala 1,000 AD) and ‘*Lokopakara*’ (Chavundaraya, 1,025 AD). Unfortunately, the preparation, use and beneficial role of *Kunapajala* was forgotten till publication of English translated version of *Vrikshayurveda*. Valmiki Sreenivasa Ayangarya was the first one who experimented with *Kunapajala* and documented the beneficial role of herbal *Kunapajala* on mango and coconut. He also observed enhancement in growth of chilli plant after application of herbal *Kunapajala* prepared from naturally fallen sour mango and soapnut. Later, in Arunachal Pradesh, he prepared different types of *Kunapajala* like Indsafari (through aerobic fermentation of safari fish in cow urine), Mushika Kunapa (through aerobic fermentation of body parts of rats in cow urine) and Kukkuta Kunapa (through aerobic fermentation of chicken flesh in cow urine) to apply in different crops like tea bushes, kiwi fruit garden *etc.* and obtained positive results through their growth promoting and pesticide properties (Biswas and Das, 2023).

History of Kunapajala

According to Surapala’s *Vrikshayurveda*, the flesh, bone marrow, brain, blood and excreta of a dead boar are collected as and when available and mixed with water for further storage under the ground to avoid foul odour as well as to protect from other animal’s attack. Later he suggested



to use fat, bone marrow, flesh, blood and excreta of any animals (specially, with horns) and fishes as per the availability, which gives flexibility to the farmers to use raw materials properly. Before storage, all the animal and fish excreta or body parts should be boiled in water and kept in earthen pot with sufficient addition of paddy husk. During the time of use, this mixture is cooked after adding sesame oilcake, honey and water-soaked black gram. A little ghee can also be poured into the mixture. About 300 years after Surapala's documentation, Sarangadhara mentioned that (Upavanavinoda' from 'Sarangadhara-paddhati') flesh, fat, bone marrow of animals (deer, pig, sheep, goat, rhinoceros etc.) and fishes are boiled in water and compound milk, sesame oilcake powder, blackgram (boiled in honey), pulse decoction, ghee and hot water are added into the earthen pot containing the boiled substances. Afterwards, the pot is kept in a warm place for about two weeks to incubate boiled Kunapajala before use.

Chakrapani's (1577 AD) 'Vishvavallabha' also described the preparation of Kunapajala which was almost similar to Sarangadhara's procedure with animal skin is the only new addition as a raw material.

Nene (1999) showcased that other than animal or fish body parts and wastes, Kunapajala can also be prepared using plant-based products. This herbal version of Kunapajala is popularly known as 'Shasyagavya' which is prepared by fermenting the mixture of cow dung, cow urine, weed or plant parts or vegetables wastes and water in 1:1:1:2 ratios, respectively.

Different methods of Kunapajala preparation (Biswas and Das, 2023).

Methods	Procedure
1. Narayanan (2006) Rat pieces: few, Cow urine: 3 lit, Cow dung: 5 kg, Sugar: 500 g, Black gram: 250 g, Sesame: 250 g, Cow milk: 1 lit and Honey: 100 ml	<ul style="list-style-type: none"> ➤ Cut fewer pieces of rats into pieces and put in container ➤ Add cow dung, cow urine, sugar, black gram and sesame and allow for aerobic fermentation for two weeks ➤ Add, Cow milk and honey into it ➤ Finally, filter the mixture to get filtrate i.e., 'Rat Kunapa
2. Ali et al. (2012) Animal waste/Fish bones/Fish meal: 1 kg, Cow dung: 1 kg, Cow urine: 1 lit, Water: 2 lit	<ul style="list-style-type: none"> ➤ All the raw materials are poured in a container of required quantity and stir it properly ➤ Keep the container for aerobic fermentation of mixture for 25 days and stirred regularly ➤ After stipulated time, sieve it for Kunapajala



<p>3. Nene (2012) Bombay duck fish: 10 kg, Sesame oil cake powder: 4 kg, Paddy husk: 4 kg, Molasses: 4 kg and Fresh cow urine: 30 liters</p>	<ul style="list-style-type: none"> ➤ Pour all these ingredients in a 80 liter container and mix thoroughly ➤ Keep this container under the shade for minimum 60 days with intermittent stirring to ensure proper fermentation ➤ After that sieve the fermented mixture through clean cloth
<p>4. Jani et al. (2017) Fish and Mutton: 3 kg, Honey: 2.5 kg, Milk: 6 liters, Sesame: 500 g, Black gram: 500 g, Water: 12 liters</p>	<ul style="list-style-type: none"> ➤ Boil the fish and mutton in water till 6 lit meat juice is obtained, which is cooked later ➤ Pour the meat juice in a porcelain jar which is pre fumigated using dried <i>Commiphora wightii/Piper nigrum/Nardostachys grandiflora</i> ➤ Then, add Milk, Honey, Sesame and Black gram ➤ Mouth of the jar is closed with lid and sealed with mud smeared cloth ➤ Keep this jar for aerobic fermentation for 15 days ➤ After that mouth of the jar is opened and solution is filtered through clean cloth multiple times
<p>5. Thakur (2018) Water: 5 lit, Animal flesh/fish: 1 kg, Milk: 1 lit, Ghee: 1 kg, Honey: 500 g and Cow urine: 1 lit</p>	<ul style="list-style-type: none"> ➤ Boil the animal flesh/fish in water and transfer it in earthen container followed by adding the remaining ingredients ➤ Add 5 liters of hot water into the mixture ➤ Close the mouth of the container with clean cloth ➤ Regularly, stir the mixture for 14 days duration ➤ After that, materials are sieved well and used on any crop at any time by diluting it with water in 1:10 ratio
<p>6. Naik et al. (2022) Herbal Kunapajala (Nettle based): Cow dung: 20 kg, Cow urine: 20-liter, Sprouted Urd, Mustard cake, Crushed jaggery: 2 kg, Water: 20 liters, Nettle plants: 20 kg, Milk and Butter milk: 1 liter each and Paddy husk</p>	<ul style="list-style-type: none"> ➤ Add cow dung, cow urine, sprouted urd, mustard cake, crushed jaggery and water in 200 lit plastic drum ➤ Add fresh finely chopped nettle plants ➤ Boil the Paddy husk in water 2 days prior to Kunapajala preparation for 15-20 minutes ➤ Mix all the ingredients thoroughly with wooden stick and water is added upto the mouth of drum ➤ Close the lid after preparation



	<ul style="list-style-type: none"> ➤ Stir the solution during morning and evening hours upto 20 to 25 days until bubble appears stops ➤ Finally, solution is filtered and stored
Herbal Kunapajala (Weed based) Cow dung: 20 kg, Cow urine: 20 liter, Sprouted Urd, Mustard cake, Crushed jaggery: 2 kg, Water: 20 liters, Neem, Wild jasmine/Local weeds: 20 kg, Paddy husk	<ul style="list-style-type: none"> ➤ Similar to above mentioned procedure except that the use of weeds instead of nettle plants
Integrated Herbal Kunapajala: Same as Weed and Nettle based	<ul style="list-style-type: none"> ➤ It is prepared by mixing half of each quantity of nettle plants and weeds and following the above-mentioned procedure

Bio-physico-chemical properties of Kunapajala

Depending up on the raw materials, Kunapajala is known to contain various macro and micronutrients, beneficial microorganisms, plant growth promoting hormones, essential amino acids. According to Martinez (2008), Kunapajala is rich in carbohydrates, proteins and alkaloids obtained from milk, sesame and black gram. Further, animal and fish body parts supply ample amount of phosphorus, triacylglycerides, esters, sterol ester, phospholipids, vitamins A, D and E *etc.* Honey in preparation of Kunapajala acts as a source for carbohydrates which accelerate fermentation process. It is also rich in microorganisms like rhizobium, azotobacter, azospirillum, phosphorus solubilizing bacteria, trichoderma and pseudomonas. It is rich in various nutrients *i.e.*, highest P, K, Ca, Mg, Fe, Zn, Cu & Mn 40 days after preparation and it had highest N and S 20 days after preparation. It can be applied into the soil or as foliar spray or through seed treatment/priming. The addition of paddy husk in makes the Kunapajala rich in silica which in turn helps the plants to become robust against pest and disease attacks. Milk used for Kunapajala preparation shows resistance against certain viral diseases *viz.* tobacco mosaic virus, rice tungro virus (Chakraborty *et al.*, 2019).



Multiple mode of action for improving crop productivity

- Biomass-degrading bacteria: An implication in the *Kunapajala* technology to recycle animal waste
- It is the source of essential plant nutrients: An in-situ resource recycling mode to promote the nitrogen, phosphorus, and potash cycles in agro-ecosystems
- Microbial pool of plant beneficial bacteria and their contribution to the plant nutrient niche of *Kunapajala*
- Bacterial isolates from the class of free-living nitrogen fixers and phosphate soluble bacteria also contribute to the IAA reservoir of the *Kunapajala* formulation
- *Kunapajala* formulation, in addition to the derived bacterial strains, could be recommended as a source of plant biostimulants in crop fields (Mukherjee *et al.*, 2022).

General role of *Kunapajala* in Crop Production

Kunapajala plays an important role in uplifting crop productivity and quality through providing various nutrients for the plant's uptake from soil or foliar absorption enhancing vegetable productivity. Further, presence of beneficial micro-organisms, enzymes, plant growth promoting hormones can help to boost up the crop yield when applied alone or in combination with other organic/inorganic nutrient sources. It improves plant height, number of branches, leaf area index, osmotic potential, total chlorophyll, chlorophyll stability index, carotenoids, xanthophylls and yield due to availability of good amount of nutrients, micro-organisms, enzymes, growth hormones. Quickest attainment of flowering extended fruiting phase, increments in size, fresh weight and shelf life of vegetables. Being a liquid in nature, it has the property to reach the root zone of the crop when applied in soil, resulting in high uptake of nutrients. Foliar application, however, is more effective as compared to soil application as nutrients are absorbed more efficiently than root uptake. Further, through cooking and fermentation of the raw materials of *Kunapajala*, protein, fat, carbohydrate etc. of this liquid formulation are broken down well into simple products (low molecular weight), resulting in quicker and greater availability of nutrients to the plants as compared to other conventional organic products.

Kunapajala as organic crop protection formulation

Along with the nutritional properties, *Kunapajala* also provides resistance against insects and diseases. It is multipurpose, fully-fermented bioformulation supports excellent plant growth, increases yields, and protects plants from major biotic stresses (diseases and insect/pests). It serves as an eco-friendly nutrient, water, disease, and soil health management system (Y. L. Nene, 2012). Deshmukh *et al.*, (2011) stated that *Kunapajala* can enhance the growth and provide greater



disease resistance than other contemporary organic formulations, which altogether increase crop yield. Ayangarya (2005) applied his *Kunapajala* preparation (Indsafari) as foliar spray @ 1% and controlled tea mosquito bug (*Helopeltis theivora*) and loopers (*Biston suppressaria*) in tea garden.

Conclusion

Over the years, various research reports have confirmed that *Kunapajala*, being a traditional organic liquid bio-formulation, which can uplift the agricultural productivity in a sustainable way through effectively reviving the soil health, improving soil physical, chemical and biological properties, providing variety of nutrients, growth promoting hormones, enzymes and vitamins for crop growth as well as building resistance in crop against insects and diseases. Depending on the availability and feasibility of raw materials, this traditional and indigenous formulation 'Kunapajala' could be prepared as a suitable bioinput for nonchemical farming systems like organic and natural farming. It is also having the potential to make farmers self-sustainable due to non-dependence on external inputs for chemical free farming.

References

- Biswas, S. and Das, R. 2023. *Kunapajala: A Traditional Organic Formulation for Improving Agricultural Productivity: A Review. Agricultural Reviews*. Doi:10.18805/ag.R-2570. ISSN 0976-0741.
- Chakraborty, B., Sarkar, I., Kulukunde, S., Maitra, S., Khan, A.M., Bandyopadhyay, S., Sinha, A.K. (2019). Production of *Kunapajala* and *Sanjibani*, their nutritional contributions, microbial and pesticidal effect. *Current Journal of Applied Science and Technology*. 37(2): 1-11.
- Mukherjee, S., Basak, Chakraborty, A., Goswami, R., Ray, K., Ali, N., Santra, S., Hazra, A. K., Tripathi, S., Banerjee, H., Layek, J., Panwar, A.S., Ravishankar, N., Meraj, A. and Chatterjee, G. 2022. Revisiting the oldest manure of India, *Kunapajala*: Assessment of its animal waste recycling potential as a source of plant biostimulant. *Front. Sustain. Food Syst.*, 6. <https://doi.org/10.3389/fsufs.2022.1073010>.

