

***Kunapajala* – A Liquid Organic Manure of Antiquity**

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The dictionary meaning of the Sanskrit word *kunapa* is “smelling like a dead body, stinking”. The manure *kunapambu* or *kunapajala* (*jala*=water), which was prepared and used since the ancient times in India, was appropriately named because it involved fermentation of the animal remains, such as flesh, marrow, etc.

Documented references to *kunapajala* are found in two possibly contemporary documents, viz., Vrikshayurveda by Surapala, who possibly lived around 1000 AD in eastern India and Lokopakara compiled by a poet Chavundaraya in 1025 AD in Karnataka in southern India. While Chavundaraya did not give details of preparation, he suggests use of *kunapajala* in several situations for improving tree growth, flowering, and fruiting. In Vrikshayurveda of Surapala, we find the following verses (Sadhale, 1996).

Verse 101. The excreta, marrow of the bones, flesh, brain, and blood of a boar mixed with water and stored underground is called *kunapa*.

Verse 102. As per availability, the fat, marrow, and the flesh of fish, the ram, the goat, and other horned animals should be collected and stored.

Verse 103. These should be boiled after mixing with water, and the mixture should be stored in an oiled pot after adding sufficient quantity of husk.

Verse 104. After roasting (cooking) it in an iron pot, sesame oil cake and honey should be added. Soaked black gram of good quality should also be added. A little ghee should then be poured.

Verse 105. The items stated above should be taken at random as there is no measure for anything. One by one, items should be placed in the pot in a warm place by a competent person.

Verse 106. This *kunapa* is highly nourishing for the trees. This is as stated by the ancient sages and I (Surapala) repeat in here after verifying the same.

In summary, Surapala’s procedure involves collecting and storing animal wastes as and when available. Although wastes from dead boar were mentioned first, Surapala expanded the source of wastes to other animals, especially those with horns. The wastes are boiled and then stored after mixing husk (paddy?). Later the material is cooked with addition of sesame oil cake, honey, and soaked black gram, and finally topped with ghee. In verse 101, the suggestion to store animal wastes underground must be to control foul odor as also to protect materials from stray animals such as dogs.

In the verses that follow the above quoted ones, Surapala has mentioned wastes from other animals such as cow, porpoise, cat, birds, deer, elephant, etc. In other words, *kunapajala* can be prepared from virtually any animal waste, and this therefore gives flexibility to farmers in preparing *kunapajala* according to their convenience.

Almost 300 years later, Sarangadhara (1283–1301 AD) was a scholar in the court of King Hammira of Sakambhari-desa (modern Bundelkhand). He wrote an encyclopedic work “Sarangadhara-paddhati” in which, one chapter, Upavanavinoda, dealt with arbori-horticulture as given below (Majumdar, 1935):

Verses 171–174. One should boil the flesh, fat, marrow of deer, pig, fish, sheep, goat, and rhinoceros in water, and when it is properly boiled one should put the mixture in an earthen pot and add into the compound milk, powders of sesame oil cake, black gram boiled in honey, the decoction of pulses, ghee, and hot water. There is no fixity as to the amount of these elements; when the said pot is put in a warm place for about a fortnight, the compound becomes what is called *kunapa* water (*kunapajala*), which is very nourishing for plants in general.

Sarangadhara was clear that almost any animal waste can be used in preparing *kunapajala*. He confirms the recommendation by Surapala, without naming him, about the inclusion of black gram, ghee, and honey. Milk is also added. Incubation of boiled *kunapajala* for two weeks is specified.

More than 250 years after Sarangadhara, Chakrapani Mishra (1577 AD) compiled Vishvavallabha (Sadhale, 2004), in which the *kunapajala* is described in Chapter VII as follows:

Verse 2. Fat, marrow, skin, blood along with the marrow secretion of ram, sheep, deer, fish, and so on should be mixed with water and cooked on fire. When properly cooked, milk and cold water should be added.

Verse 3. Oilcake of sesame, honey, and ghee should be added to the mixture and the pot should be removed from fire to be kept in a warm place for a fortnight. This liquid called “*kunapa*” is nourishing for trees.

The description given by Chakrapani Mishra is almost the same as that given by Sarangadhara. Skin is the only additional material specified by Chakrapani for making *kunapajala*.

Thus we may note that while the basic constituents of *kunapajala* remained the same, some changes were suggested over centuries. In fact the message one gets through all these descriptions is that preparation of *kunapajala* allows considerable flexibility to a farmer in choosing constituents and their proportions, as also in the procedure.

Preparation and use of *kunapajala* has been virtually forgotten until the Asian Agri-History Foundation published the English translation of Vrikshayurveda by Surapala, which was composed in Sanskrit around 1000 AD. Even after publication of *kunapajala*, hardly any agricultural scientist took any interest in understanding it and experimenting with it. Strange as it may sound, the first person who experimented with *kunapajala* was Valmiki Sreenivasa Ayangarya, a mathematician by training, who renounced materialistic life about 20 years ago and dedicated himself to the tribal welfare activities (Address: Keshavapuri, Village Khorad, Post Dongarkharda, District Yavatmal 445 323, Maharashtra). He first published a short note “Herbal *kunapa*” in the journal Asian Agri-History in 2004 (Ayangarya, 2004a). Valmiki reported excellent results when *kunapajala* was applied to mango and coconut. He further tried a “herbal *kunapa*” using naturally fallen sour mango fruits and soapnut (*Sapindus emarginatus*) and applied it on chili plants with excellent results. Valmiki also published a report (Ayangarya, 2004b) on “*manujala*” in which he used vegetable organic wastes and fermented those in human urine. He again observed excellent effects on the growth of several fruit and vegetable plants.

Valmiki continued his experimentation with *kunapajala* in Arunachal Pradesh in Northeast India (Ayangarya, 2005). He developed “herbal *kunapa*” and called it *Sasyagavya*. With the help of staff at the Abali Tea Estate, Abali Village, Roing 792 110, Arunachal Pradesh, he used to produce 5,000 to 10,000 liters *Sasyagavya* everyday and apply it to the soil. Tea plants started looking healthy. He prepared *kunapajala* by fermenting aerobically *safari* fish (mentioned in Vrikshayurveda) in cow urine and sprayed tea bushes at 1% concentration of the ferment, which he named *Indsafari*, to most effectively control the attack by tea mosquito, *Helopeltis* with 10-day interval schedule. Foliar sprays with *Indsafari* at 1% concentration also controlled the loopers on shade trees commonly grown in tea gardens. Valmiki found *Indsafari* both insecticide and growth promoter. In addition, Valmiki prepared *kunapajala* from poultry (chicken) bird flesh and called it *kukkutakunapa* (*kukkuta*=chicken), and used it very effectively in increasing kiwifruit yield from 120 kg in November 2004 to 1700 kg in November 2005 (Ayangarya, 2006b).

In 2006, Valmiki (Ayangarya, 2006a) reported formulation of “*mushika kunapa*” (*mushika*=rats), which was prepared by 2-week aerobic fermentation of cut pieces of captured rats in cow urine. After filtering the liquid, it was sprayed on tea bushes at 1% concentration. Results were most promising. Around the same time Narayanan (2006), a social worker in Tamil Nadu (5/47B Soundaram Nagar, Ambathurai Village, Gandhigram PO, Dindigal District 624 302, Tamil Nadu) reported formulation of “rat *gunapa*” or “*mushika kunapa*”. The “rat *gunapa*” (Narayanan, 2006) was prepared by a 2-week fermentation of rat pieces, 5 kg cow dung, 3 L cow urine, 500 g sugar, and 250 g black gram and sesame. Later 1 L cow milk and 100 ml honey were added. Not only growth effects were reported but also the rats disappeared from sprayed fields.

Use of *kunapajala*, and other products at the tea estate in Arunachal Pradesh by Valmiki led to chemical residue-free tea, which points to a remarkable advantage of *kunapajala*, etc. over the current usage of chemicals.

In verse 103 of Surapala’s Vrikshayurveda, husk, possibly of paddy, was added at the time of storing *kunapajala* after the ingredients were boiled. Paddy husk is known to be rich in silica and some of the silica is expected to be released in *kunapajala*, which in turn should help in producing robust plants that could resist diseases and pests.

In Tamil Nadu, Natarajan (2003) popularized the use of *panchagavya* (cow dung, urine, milk, curd, and ghee). *Panchagavya* has been actually prescribed in Garudapurana and Varahapurana. A person takes it as *achaman* (sip) for purifying himself from *paap* (sin) for having eaten prohibited food (*abhakshabhakshyam*), after births or deaths in the family. Use of *panchagavya* in agriculture is not documented anywhere. Also Natarajan adds other ingredients to *panchagavya* such

as sugarcane juice, coconut water, banana, etc. Further the mixture is allowed to ferment aerobically for a week. Thus in strict sense, Natarajan is not recommending *panchagavya*, but essentially a *panchagavya-kunapajala*.

Valmiki's insecticide *Indsafari* is a fermented product of *safari* (a tiny weed fish) in cow urine (Ayangarya, 2005). This preparation is in line with the recommendation of Chakrapani Mishra in Vishvavallabha (Chapter VIII, verse 39), wherein to control "external" insects, powders of the barks of *aragvadha* (*Cassia fistula*), *arishta* (*Sapindus emarginatus*), *karanja* (*Pongamia pinnata*), *saptaparna* (*Alstonia scholaris*), and *bidanga* (*Embelia ribes*) soaked overnight in cow urine, are pasted on affected parts. Cow urine improves efficacy of the medicine/chemical according to the scientists of the Central Institute of Medicinal and Aromatic Plants (Lucknow, India), who have demonstrated that cow urine contains chemicals that act as "bioenhancers" and therefore increase efficacy of the drug mixed with "bioenhancer" from cow urine distillate. Mixing medicines in cow urine is a very common practice in Ayurveda for improving efficacy of the medicines.

Constituents of typical *kunapajala* are flesh and other animal parts. It would be pertinent to mention here what is called "Salsette Experiment" on rice in 1884. Watt (1891) states, "A field specially selected for test-raping was located at Salsette (near Mumbai). The seed sown per acre was 100 lb, the yield of grain from the same 4220 lb (4.8 t ha⁻¹) and of straw 14,253 lb, the total value of the produce having been put down at Rs 73-12-0 (Rs 73.75)." The remark made against that experiment states that the crop was obtained from "unirrigated, un-rabbed (field not parched) rice, grown every year on a land reclaimed from the sea-side and sweetened by heavy sweepings from the Bandra slaughter-house at 120 cartloads per acre." The experiment was abandoned because of the exceptionally high yield of paddy. This information is most striking, but not surprising in the context of recommendations made repeatedly in Vrikshayurveda to apply preparations (e.g., *kunapajala*) made from animal flesh, marrow, etc. to obtain high yields of quality produce from fruit and flowering trees (Sadhale, 1996).

It is generally stated in almost all textbooks that plant roots utilize chemical fertilizers faster than organic manures. This is true when the organic manures, which are soft and semi-dry, are scattered in the field. *Kunapajala* and its application are very different from the application of other organic manures. *Kunapajala* is a liquid and therefore ready to reach root zone in a short time. Secondly, the ingredients of *kunapajala* have been fermented, which means the mass (proteins, fats, etc.) is already broken down into simple low molecular weight products, and therefore nutrients from which would become available to plants faster than from the traditionally applied organic matter (Neff *et al.*, 2003). It is only the farmers and sages of ancient India who took pains to formulate and use improved organic manure for perennial plants.

It is most relevant to point out here a recent study by the scientists at the University of Lancaster and Britain's Institute of Grassland and Environmental Research. Professor Richard Bardgett and his team have found that not only can organic nitrogen be directly taken up by plants, but also it is used differently by different species, enabling nitrogen sharing and biodiversity. Tagging organic nitrogen (amino acids) with stable isotopes revealed that different plant species prefer different sources of organic nitrogen. This research provides important new information about what happens to organic nitrogen in real ecosystems in real time. The research results have appeared in the April 2006 edition of *Business*, a magazine of Britain's Biotechnology and Biological Sciences Research Council.

So far the Indian agricultural scientists have been least interested in *kunapajala*. Only social workers have taken interest and have demonstrated the immense fertilizer value that the *kunapajala* offers. Indian agricultural scientists have an unprecedented opportunity to work on the formulation, efficacy, utilization, biological interactions of *kunapajala*. If Indian agricultural scientists do not, foreign scientists will take initiative, and as in the past, our scientists will then follow them.

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