Two-day Workshop on "Vrikshayurveda and Traditional Practices in Uttarakhand State: Present Status and Future Potential"

23-24 October 2019, GBPUA&T, Pantnagar

REPORT

Asian Agri-History Foundation
and
GB Pant University of Agriculture & Technology
Pantnagar-263145, Dist. Udham Singh Nagar, Uttarakhand

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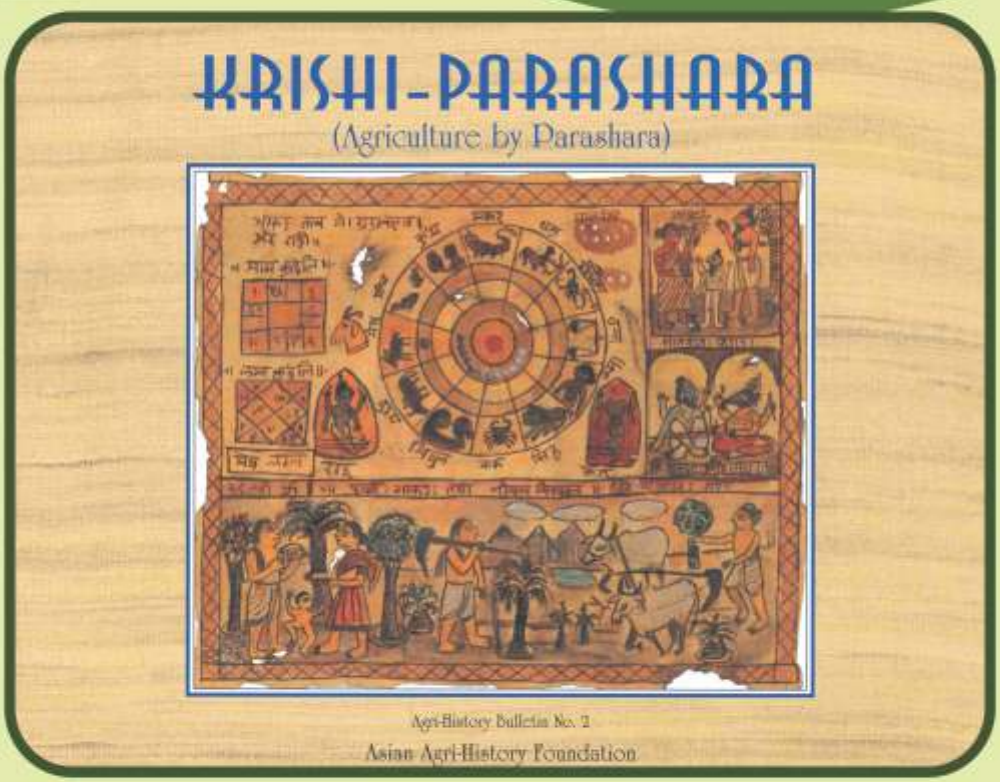
Note:

The Workshop was co-organized by Asian Agri-History Foundation (AAHF), GB Pant University of Agriculture & Technology, Pantnagar, and the Uttarakhand Chapter of AAHF and co-sponsored by the Department of Agriculture, the Horticulture Mission, Indian Council of Agriculture Research, New Delhi, and the Tea Board of the Ministry of Agriculture of the state of Uttarakhand.

The First Text Book on Agriculture
logically organized in chapters
was given to world by India in 400 BC

"Krishi-Parashara"

A Sanskrit text: Written by Maharishi Parashara



Main features of Krishi-Parashara

- Over 2,000-year-old Sanskrit text
- Models for predicting rainfall
- Management of farming and cattle
- Seed health
- Useful in modern agriculture

Note from the Chairman, AAHF

Uttarakhand is the mandated state of the GB Pant University of Agriculture and Technology (GBPUA&T) in which agriculture plays a significant role in its economy. The hilly areas of the state traditionally have smallholder farming and practice mostly traditional low-input farming on fragmented lands with low productivity. These farmers lately have been using high modern inputs, some of them excessively, in quest of increasing their crop yields and incomes. The higher use of chemical fertilizers and pesticides has resulted in soil and water pollution, ecological imbalance, environmental concerns, and human health. Thus, these farmers are always under pressure to produce more from per unit area of their land to sustain themselves and their families, which is becoming a difficult task every season. Even the adoption of high inputs (chemical fertilizers and pesticides) has not yielded the expected outcomes, and as a result has caused further unnecessary financial hardship to these farmers. The resulting not-so-promising situation has certainly caused worry and insecurity among this category of farming community which is certainly a major cause of social concern for the Uttarakhand government.

Considering the above situation, the Asian Agri-History Foundation (AAHF), which is now located in the College of Agriculture of the GBPUA&T, Pantnagar since June 2019, thought of addressing the problems of these hilly farmers through the use of Vrikshayurveda practices to alleviate their problems. To understand better their agriculture and the associated biological constraints and to come up with pragmatic answers to their problems, a Preliminary Orientation Meeting on Vrikshayurveda was organized on 1 October 2019 followed by a Two-day Workshop on "Vrikshayurveda and Traditional Practices in Uttarakhand State: Present Status and Future Potential" on 23-24 October 2019 at GBPUA&T, Pantnagar. These were co-organized by AAHF, GBPUA&T, Pantnagar, and Uttarakhand Chapter of AAHF (UC-AAHF), and were co-sponsored by the Department of Agriculture of Uttarakhand state, Horticulture Mission of Uttarakhand state, and the Tea Board of Uttarakhand.

We are happy to present a Report on the Two-day Workshop together with its recommendations. We certainly hope that this Report would be found useful by all the stakeholders.

I express my sincere appreciation to Dr Sunita T. Pandey, Professor of Agronomy and Honorary Executive Secretary of AAHF, Dr RP Singh, Professor of Plant Pathology and Secretary of UC-AAHF and their colleagues, and Dr J Kumar, Dean, Agriculture, for their support in the organization of the meeting and the workshop. I must also express my sincere appreciation to my AAHF colleagues, and Dr Tej Partap, Vice-Chancellor, GBPUA&T, for their contributions to the Workshop.

SPS Beniwal, PhD

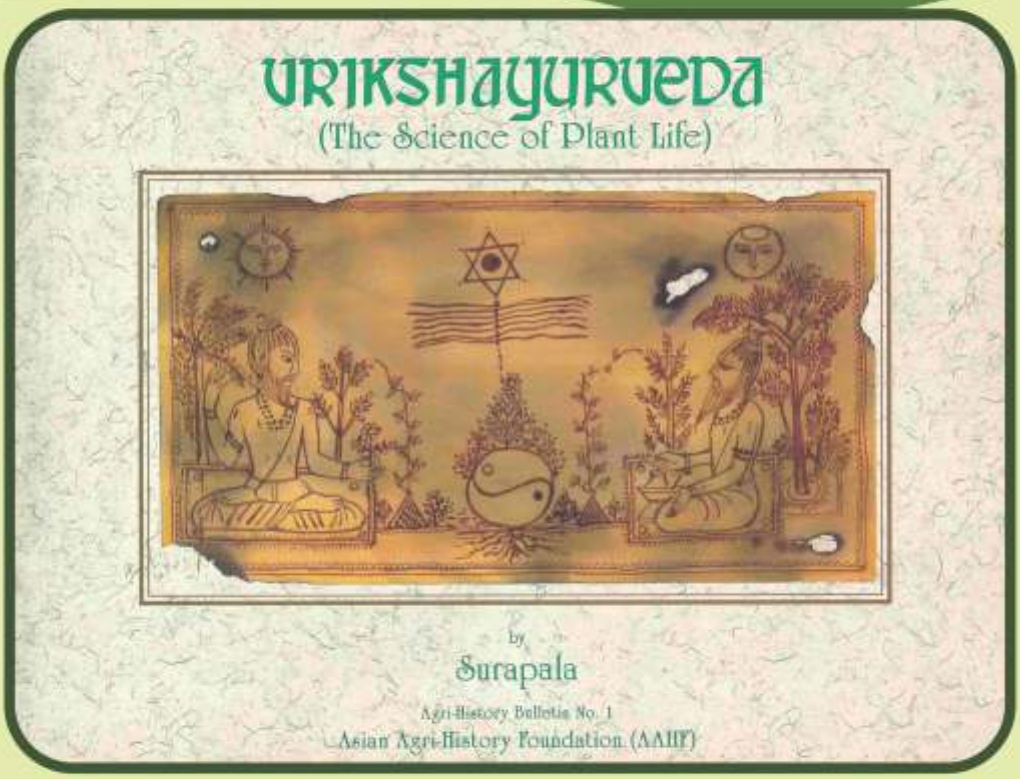
Chairman, AAHF

The First Fermented Liquid Organic Fertilizer **"Kunapajala"** given to world by India approx 1000 years ago through

"Vrikshayurveda"

(The Science of Plant Life)

A Sanskrit text: Written by Vaidya Surapala



Main features of Vrikshayurveda

- Approx 1,000-year-old Sanskrit text
- Recipes for obtaining high yield of fruit crops
- Plant nourishment and fertilizers
- Diseases of plants & plant protection
- Highly relevent to modern organic agriculture

1. Summary Report of Workshop

A two-day workshop on "Vrikshayurveda and Traditional Practices in Uttarakhand State: Present Status and Future Potential", was held on 23-24 October 2019 in the College of Agriculture, GB Pant University of Agriculture and Technology (GBPUA&T), Pantnagar to assess the present status on the use of Vrikshayurveda practices and future potential for their use for the smallholder farmers of Uttarakhand state. The workshop was organized jointly by the Asian Agri-History Foundation (AAHF), GBPUA&T, and the Uttarakhand Chapter of AAHF (UC-AAHF), and was co-sponsored by the Department of Agriculture, the Horticultural Mission, and the Tea Board of the Ministry of Agriculture of the state of Uttarakhand. The workshop was organized in conjunction with the Silver Jubilee Anniversary of AAHF, now based at GBPUA&T since June 2019.

The workshop was attended by 125 participants which included 72 smallholder farmers from different districts of Uttarakhand; four NGOs, District Agricultural Officers/their representatives of the Department of Agriculture from different districts; District Horticultural Officers/their representatives from different districts; Tea garden officers from the Uttarakhand Tea Board; invited technical experts on Vrikshayurveda from Rajasthan, West Bengal, and Kerala; members of the UC-AAHF; faculty members of the Departments of the College of Agriculture; five trustees of AAHF; and invited guests.

The workshop, after the inauguration by the Acting Vice-Chancellor of GBPUA&T, Dr AP Sharma, Registrar of GBPUA&T, as the Vice-Chancellor was away on an official travel, was conducted as per the programme attached (Annexure II). The Chairman of AAHF Dr SPS Beniwal welcomed the participants, introduced them to AAHF, its Founder Chairman, late Dr YL Nene, and its activities, and outlined the workshop objectives.

In the Silver Jubilee Anniversary Function, two presentations were made: One on "AAHF: 25 Years of Journey so far" by Dr SL Choudhary, former Chairman of AAHF, and the second on "AAHF: Looking Ahead" by Dr SPS Beniwal, the current Chairman of AAHF. It was a good opportunity to take a stock of the AAHF's activities of the last 25 years and to project its future activities. The AAHF during its first 25 years of its establishment has done a commendable work of unearthing and sharing the agricultural heritage of Asia especially of India as was clear from the presentation of Dr Choudhary. Dr Beniwal in his presentation on "AAHF: Looking Ahead" highlighted the areas and activities where AAHF would lay emphasis in future. The AAHF also took advantage of this opportunity to recognize 24 individuals/institutions that over the 25-year period made significant/special contributions to the development and activities of AAHF. These included: Prof Prabhakar M Tamboli, Trustee of AAHF; Mrs Prabha Nene, wife of late Dr YL Nene; Sri Raju Barwale, Chairman, Mahyco; Sri Salil Singhal, Chairman Emeritus PI Industries; Prof Dr Lindsay Falvey, Former Dean and Chair of Agriculture, University of Melbourne, Australia; Late Dr KL Mehra; Sri Sipani of Sipani Krishi Anusandhan Farm; Sri Badri Prasad Cheritable Trust, Jaipur; Dr SL Choudhary, former Chairman, AAHF, Sri Vijay Parmar, Chairman of the West Bengal Chapter of AAHF and CEO, Mittal Group of Tea Gardens, Siliguri, West Bengal; Dr MC Saxena, Trustee and Chief Advisor to Chairman, AAHF; Dr SN Nigam, former Chairman of AAHF; Sri CV Jidesh,

Secretary, Kerala Chapter of AAHF (KC-AAHF); Dr Sunil Khandelwal, former Secretary, Rajasthan Chapter of AAHF (RC-AAHF); Dr Tej Partap, VC, GBPUA&T, and Patron, AAHF; Dr J Kumar, Dean College of Agriculture, GBPUA&T, and Co-Patron, and Trustee of AAHF; the trustees of AAHF (Dr BL Agarwal, Dr SPS Beniwal, Dr CLL Gowda, Mrs Purnima Raste, Dr Gajendra Singh, Dr MVK Sivakumar, and Dr RP Thakur) for their support and contributions to AAHF; and Dr Sunita T Pandey, Honorary Executive Secretary of AAHF and Professor of Agronomy, for her contributions in the establishment of AAHF HQ at GBPUA&T, Pantnagar.

Before starting the technical sessions of the Workshop the participants were exposed to a field visit to see the demonstration trials conducted under the protocols of Zero Budget Natural Farming (ZBNF, based on the basic philosophy of Vrikshayurveda) on rice, and intercropping of *mandua* (minor millet) with rice bean at Norman E Borlaug Crop Research Centre of GBPUA&T.

In the two technical sessions of the workshop, two presentations, one on the present situation, and the other on future potential of the use of Vrikshayurveda practices were made by Prof Kewalanand and Dr Sunita T Pandey, respectively. In addition, two presentations on the success stories of the use of Vrikshayurveda practices were made by two technical experts: one on different crops in Kerala by Sri CV Jidesh, and the second on West Bengal tea gardens by Sri Vijay Parmar, which were found very useful and educative, and were very much appreciated by the participants. Sharing of his experiences on the use of Vrikshayurveda by Dr SL Choudhary, a technical expert on Vrikshayurveda, and the former Chairman of AAHF, was also found very useful by the participants. Detailed discussions followed the technical presentations in which farmers actively participated and raised pertinent queries relating to their crops and problems of their areas. Based on these discussions, conclusions were drawn that guided the preparation of a "Plan of the future activities" relating to Vrikshayurveda practices in different crops and areas of Uttarakhand state.

A practical on "How to prepare *Kunapajal*a?" was also conducted for the benefit of the participants in the morning of 24 October to provide them a hands-on training, in which farmers showed a keen interest in learning how to prepare it, raised a number of pertinent questions, and very much appreciated this practical exercise.

Based on the workshop deliberations and discussions and conclusions during the 2-day workshop it was agreed by the participants that: (i) Vrikshayurveda practices have great relevance, potential and strength for use in the sustainable agriculture of the smallholder farmers of the hilly areas of Uttarakhand, (ii) the fermented liquid fertilizer – *Kunapajala* – described in Surapala's Vrikshayurveda (c. 1000 CE) can be extremely useful and effective in ensuring the proper crop/plant nourishment and their protection in eco-friendly manner from insect-pests and diseases, and in maintaining good soil health, and thus helping in increasing crop productivity as shown by AAHF's practical experiences in Darjeeling and Dooars tea gardens of northern West Bengal state, and in different crops in Kerala state, (iii) *Kunapajala* can play a significant role in enhancing crop productivity of "Jaivik Kheti", as lower crop productivity problem was highlighted as a problem by the farmer participants who have been practicing it for the last several years, (iv) a work-plan that was prepared and presented in the Plenary Session of the workshop be approved including the locations of work and their crops, and (v) a new project now be developed by AAHF for further

discussion and finalization and submission for financial support from the Uttarakhand government. The proposed project, after its approval and receiving funding from the Uttarakhand government, would be jointly implemented by AAHF, GBPUA&T, Ministry of Agriculture (Departments of Agriculture, Horticulture Mission, and Tea Board), and relevant NGOs.

The Plenary Session was attended by the Vice-Chancellor of GBPUA&T and Patron of AAHF, Dr Tej Partap, and the Chief Advisor to the Chairman of AAHF, Dr MC Saxena. Both the guests appreciated the efforts of AAHF in organizing the workshop for introducing the Vrikshayurveda practices to the smallholder farming of the state of Uttarakhand. While welcoming AAHF's HQ at Pantnagar, Dr Tej Partap wished well to AAHF and offered some useful suggestions for future activities of AAHF at GBPUA&T. These included: strengthening of the ongoing Graduate Student Fellowships Programme to encourage theses research on Vrikshayurveda and involvement of the university faculty in AAHF activities. He looked forward to a fruitful collaboration between AAHF and GBPUA&T, and ensured full support to AAHF for the benefit of Uttarakhand farmers. Dr MC Saxena thanked GBPUA&T and its Vice-Chancellor Dr Tej Partap, the Patron of AAHF at Pantnagar, and Dr J Kumar, Dean, College of Agriculture and the Co-Patron of AAHF, for providing facilities and support to AAHF. He expressed confidence that AAHF had a bright future with a base at Pantnagar. Dr J Kumar expressed his happiness that AAHF was now headquartered in the College of Agriculture at Pantnagar fulfilling the wishes of its Founder late Dr YL Nene. As the Dean of Agriculture, he appreciated the spirit behind the Workshop, assured full support and cooperation to AAHF and its activities, and looked forward to productive collaborative activities in future as well. The workshop was concluded with a “Vote of Thanks” proposed by Dr SPS Beniwal, Chairman of AAHF.

2. A Pre-Workshop Preparatory/ Orientation Meeting (1 October 2019)

Prior to the two-day workshop, an Orientation Meeting with the officers of the State Department of Agriculture, Horticulture Mission, Tea Board, and coordinators of the KVKs of GBPUAT, Pantnagar was held on 1 October 2019. The objectives were: (i) to expose the participants to Vrikshayurveda practices from the book Vrikshayurveda by Surapala (c.1000 CE) useful for agriculture and (ii) to get insight into important crops of Uttarakhand and their major production constraints and to identify possible locations and crops in Uttarakhand.

Welcome to delegates & participants of Orientation meeting

Discussions in the Orientation meeting and the two Technical Sessions of the Workshop provided a deep insight and inputs into identifying: (i) important crops (including major and minor indigenous field crops such as rice, pulses and millets; fruit crops; vegetable crops and their major production constraints in different areas, (ii) the existing agricultural practices in different crops in different areas, (iii) the scope and potential of introduction and integration of Vrikshayurveda practices into the existing agricultural practices for raising better quality crops with higher productivity, and (iv) identification of important locations for launching the first phase of trials and demonstrations on Vrikshayurveda practices (Table1).

Table 1. Important diseases and insects of various crops, vegetables and fruits in Uttarakhand.

Name of the Crops	Important diseases	Insects
Cereals		
Finger millet	Blast, Blight	Pink stem borer
Wheat	Yellow rust, Loose smut, False smut	
Paddy	Blast, Panicle blight, Neck blight, False smut	Stem borer
Coarse grains	Blast, Blight, Downy mildew, Smut	Termite, Stem borer
Sorghum, Pearl Millet and Maize	Downy mildew	
Mustard		Aphid, Moth
Pulses (Food legumes)		
Soyabean (*Bhatt*)	Viral diseases	Aphid
Pigeon pea	Wilt	Pod borer
Horse gram (*kulthi*)	Powdery mildew, Root rot	

Fruit crops		
Peach	Leaf curl	
Apple	Powdery mildew, Canker, Pre-mature leaf fall or Scab disease, White root rot, Fruit spot	
Apricot (*khumani*)	Gummosis	
Pomegranate	Flower drop	Fruit moth
Mango	Powdery mildew, Anthracnose, Wilt?	
Guava	Wilt, Anthracnose	
Litchi	Sun burning of fruits	
Citrus/Lemon crops	Decline, Dieback, Micronutrient deficiency	
Vegetables		
Potato	Late blight, Early blight, Bacterial wilt	White grub
Pea	Seed rot, Root rot and Wilt/Root rots, *Aschochyta* blight, Seed and Root rot, Leaf blight, White rot (?), Powdery mildew, Wilt	Pod borer, Leaf miner, Cut worm
French bean	Seed rot, Wilt/Root rots, Anthracnose, Fruit rot, Angular leaf spot	Sucking insects
Cabbage	Wilt/Root rots (Collar rot, Black rot), Head rot	Aphid, Cabbage butterfly, Cut worm, Diamond back moth
Cauliflower	Wilt/Root rots, Fruit rot, Leaf spot	Aphid, Butterfly, Cut worm, Green caterpillar, Leaf miner
Tomato	Wilt/Root rots, Early blight, Fruit rot	Fruit borer, Cutworm, Whitefly, Pinworm
Cucumber (*kheera*)	Bacterial wilt	
Capsicum	Anthracnose, Fruit rot, Damping off, Collar blight	Aphid, Thrips, Cut worm, Mites
Brinjal	Phomopsis blight, Damping off, Sclerotinia rot	Fruit borer, Stem borer
Amaranths		Leaf webber
Ginger	Rhizome rot, Soft rot, Wilt, Leaf spot/blight	Stem borer, Rhizome maggot
Others		
Tea	Dieback	Mites

3. Workshop and its Inaugural Session

After taking an account of possibilities of introduction and integration of Vrikshayurveda practices in identified crops and locations from the Pre-Workshop Orientation Meeting held on 1 October 2019 in Pantnagar, a Two-day workshop on "Vrikshayurveda and Traditional Practices in Uttarakhand State: Present Status and Future Potential", was organized on 23-24 October 2019 in the College of Agriculture, GB Pant University of Agriculture and Technology (GBPUA&T), Pantnagar to assess the present status on the use of Vrikshayurveda practices and their future potential for use for the hilly smallholder farmers of Uttarakhand state, and to develop an implementation plan to introduce and popularize the use of Vrikshayurveda practices in existing agricultural practices of important crops of Uttarakhand for enhancing the yield and quality of produce. The workshop was organized jointly by the Asian Agri-History Foundation (AAHF), GBPUA&T, and the Uttarakhand Chapter of AAHF (UC-AAHF), and was co-sponsored by the Department of Agriculture, the Horticultural Mission, and the Tea Board of the Ministry of Agriculture of the state of Uttarakhand. The workshop was organized in conjunction with the Silver Jubilee Anniversary of AAHF, now based at GBPUA&T since June 2019.

Lighting of lamp to inaugurate the workshop

The workshop was attended by over 125 participants which included 72 smallholder farmers from different districts of Uttarakhand; four NGOs, District Agricultural Officers/their representatives of the Department of Agriculture from different districts; District Horticultural Officers/their representatives from different districts; Tea garden Officers from the Uttarakhand Tea Board; Invited technical experts on Vrikshayurveda from Rajasthan, West Bengal, and Kerala; Members of the UC-AAHF; Faculty members of the Departments of the College of Agriculture; Five trustees of AAHF; and Invited guests.

The workshop was inaugurated by the Acting Vice-Chancellor of GBPUA&T, Dr AP Sharma, Registrar of GBPUA&T, as the Vice-Chancellor was away on an official travel. The session was started by Professor Sunita T Pandey, Executive Secretary AAHF, by a welcome note. The Chairman AAHF Dr SPS Beniwal extended a formal warm welcome to the guests and participants. He introduced the Asian Agri-History Foundation (AAHF) and its Founder Chairman, late Dr YL Nene to the participants, and briefly explained its activities. He also explained the workshop objectives.

The following points emerged during the Inaugural Session:

a. The Chief Guest of the session and Acting Vice-Chancellor, Dr AP Sharma pointed out that establishment of the headquarters of AAHF (one of the reputed foundations in agriculture) in the GBPUAT, Pantnagar is really a wise decision of the University as all the reputed universities of

the world always run reputed NGOs, societies & foundations under their patronage to carryout multifarious activities for their mandated areas for the welfare of the society. For this, the mandate of AAHF for bringing out valuable ancient knowledge in public domain for betterment of farmers and farming situations is an excellent field, which will definitely help the people move from the non-agriculture sectors to agricultural sector.

b. In the present scenario to sustain humanity, food security inclusive with climate change and resource conservation need to be focused for which, the role of Asian Agri-History Foundation is very relevant and important as it includes time-tested and time-honoured techniques of agriculture production which created sustainability in South and Southeast Asia for millennia. These techniques need to be researched and validated as location demonstrations and specific trials to re-confirm their impact on productivity, natural resource conservation and climate change in present scenario

Dr SPS Beniwal, Chairman AAHF, welcoming the delegates of workshop

4. Visit of participants to Norman E Borlaug Crop Research Centre

Before starting the Workshop, the participants were exposed through a field visit on 23 October to see the demonstration trial on the effect of Vrikshayurveda-based formulations on (i) paddy, and (ii) intercropping of *mandua* (finger millet) with rice bean crop at Norman E Borlaug Crop Research Centre of GBPUAT, Pantnagar. In this trial, the performance of two formulations of liquid Vrikshayurveda products such as *Jeevamrut*, and *Kunapajala* and their combinations with different dosages of farm yard manure were evaluated. The participants were very much impressed to see the performance of paddy crop which was treated with *Kunapajala* alone and with different dosages of farm yard manure.

Workshop participants visiting the demonstration trial on rice and *mandua* at NEBCRC, GBPUA&T, Pantnagar.

5. Silver Jubilee Function

The Inaugural session of the workshop was followed by the AAHF Silver Jubilee Anniversary Function. In this Function, two presentations were made: One on "AAHF: 25 years of Journey so far" by Dr SL Choudhary, former Chairman of AAHF, and the second on "AAHF: Looking Ahead" by Dr SPS Beniwal, the current Chairman of AAHF. It was a good opportunity to take a stock of the AAHF's activities of the last 25 years and to project its future activities. As was clear from the presentation of Dr Choudhary, AAHF during its first 25 years of its establishment has done a commendable work of unearthing and sharing the knowledge of agricultural heritage of Asia especially India. This was achieved through translation of the original ancient scriptures on agriculture into English and then printing them in the form of nine Ancient Classics: Agri-History Bulletins, four books, conduct of seminars, symposia and workshops and printing of their Proceedings. AAHF started a quarterly journal on Asian Agri-History in 1997, which still continues to serve a very useful purpose of disseminating information on agricultural heritage and traditional knowledge of Asia. Dr Beniwal in his presentation on "AAHF: Looking Ahead" highlighted the following areas and activities where AAHF would lay emphasis in future from its new Headquarter in Pantnagar.

Recognitions of contributions of individuals and other institutions by AAHF

like to collaborate with it on research and development activities on Vrikshayurveda-based practices through the involvement of its multidisciplinary scientists (preferably younger), and also those of other SAUs, ICAR institutions, CSIR, etc. to answer "why and how" part, and to focus on Vrikshayurveda-based R&D activities. Attempts to involve scientists from other Asian countries would also be made. Also, number of student fellowships (MSc and PhD), being supported by AAHF at GBPUA&T, would be increased to ensure greater number of graduate students working for their thesis problems on Vrikshayurveda practices, and to promote R&D on Vrikshayurveda-based practices.

Participants of workshop

It was also emphasized, with which the participants agreed, that the use of Vrikshayurveda practices has greater relevance and potential to smallholder farmers of Uttarakhand. Thus, there is ample scope of introducing these practices to them and helping them to avoid the use of chemical fertilizers and pesticides with ensured crop productivity. These practices also have relevance to medium- and large-scale farmers but considering certain limitations under the present circumstances the best way out is to marry the traditional Vrikshayurveda practices with the modern technology and science tools. This would be a good and effective way of ensuring a reduced or judicious use of inputs (fertilizers and pesticides), and would be in line with the present government's policy of reducing the overall use of urea by 40% in the country. This is achievable if we integrate the time-tested traditional Vrikshayurveda knowledge with modern science and technologies for sustainability of Indian agriculture.

The AAHF also took advantage of this opportunity to recognize certain individuals who have over the 25 year period made special contributions to the development and activities of AAHF. These included: Prof Prabhakar M Tamboli, Former Founder Trustee of AAHF and Adjunct Professor and Director, International Training Programme, University of Maryland, College Park, USA; Mrs Prabha Nene, wife of late Dr YL Nene; Sri Raju Barwale, Chairman, Mahyco; Sri Salil Singhal, Chairman Emeritus PI Industries; Prof Dr Lindsay Falvey, Former Dean and Chair of Agriculture, University of Melbourne, Australia, and International Advisor, AAHF; Late Dr KL Mehra for instituting the "Dr KL Mehra Memorial Award" for "Best paper on biodiversity", and Sri Sipani for instituting "Sipani Krishi Anusandhan Farm Award" for the "Best paper on applied agriculture' published in the Asian Agri-History journal; Sri Badri Prasad Charitable Trust, Jaipur; Dr SL Choudhary, former Chairman, AAHF, Sri Vijay Parmar, Chairman of the West Bengal Chapter of

AAHF and CEO, Mittal Group of Tea Gardens, Siliguri, West Bengal; Dr MC Saxena, Trustee and Chief Advisor to Chairman, AAHF; Dr SN Nigam, former Chairman of AAHF; Sri CV Jidesh, Secretary, Kerala Chapter of AAHF (KC-AAHF); Dr Sunil Khandelwal, former Secretary, Rajasthan Chapter of AAHF (RC-AAHF); Dr Tej Partap, VC, GBPUA&T and Patron, AAHF; Dr J Kumar, Dean College of Agriculture, GBPUA&T and Co-Patron, AAHF; the trustees of AAHF (Dr BL Agarwal, Dr SPS Beniwal, Dr CLL Gowda, Mrs Purnima Raste, Dr Gajendra Singh, Dr MVK Sivakumar, Dr RP Thakur) for their support and contributions to AAHF; and Dr Sunita T. Pandey, Executive Secretary of AAHF for her contributions in the establishment of AAHF HQ at GBPUA&T, Pantnagar.

Recognition of Dr SL Choudhary, Former Chairman, AAHF

Recognition of Dr MC Saxena, Chief Advisor to Chairman, AAHF

6. Technical Sessions

a. Technical Session-I

A presentation on "Present situation on the use of Vrikshayurveda and traditional practices in hilly agriculture of Uttarakhand State" was made by Prof Kewalanand". The following points emerged during the discussion following the presentation:

1. The use of *Vrikshayurveda* knowledge need to be introduced and integrated and popularized with existing organic agricultural practices for successful and sustainable organic farming to restore the impact of climate change and resource conservation in present scenario.

2. Through demonstrations of *Vrikshayurveda* practices, create a faith in farmers as well as in technocrats in Vrikshayurveda as it is the need of the hour. Various states have already started the work on Vrikshayurveda practices viz. Gujarat, Tamil Nadu, Kerala, and West Bengal (Darjeeling and Dooars areas). Japan is doing lots of research on *Kunapajala* (the first fermented liquid fertilizer given to world by India 1000 years ago). On the basis of the previous AAHF experiences the introduction and integration of *Vrikshayurveda* practices in tea cultivation in Uttarakhand will enhance the quality and quantity of its tea.

Dr Kewalanand deliberating during the Technical Session-I

3. The native crops of mountainous areas of Uttarakhand, viz., r*amdana* (Amaranth), *uggal* (buckwheat), m*andua* (Finger millet), etc. which have been replaced by potato, paddy and wheat need to be again focused for enhancing their production and protection and bringing them back to cultivation by integrating the practices of *Vrikshayurveda*. Various kinds of crops as well as fruit trees have also been replaced by mono-cropping of other trees having greater commercial values, resulting in reduction in biodiversity and increase in temperature. Mono-cropping that brings ill-effects on soil, plants, and environment must be discouraged to save the rich biodiversity of the state. In this context it is very important to choose the appropriate crops and their locations, viz., in Valleys, mountain slopes (East facing/North facing), high hills, medium hills and lower hills to introduce and integrate the *Vrikshayurveda* practices. The scope of raising medicinal aromatic crops, fruits, vegetables, flowers, livestock, tea, sericulture, millets, etc., have good scope for hilly areas of Uttarakhand.

4. For reducing the outmigration of youths from Uttarakhand state, the introduction and integration of *Vrikshayurveda* practices may be one of the important methods as it is very easy to prepare and apply its formulations, and thus need to be popularized among the farmers. In some of the areas, youngsters are coming back for empowering the organic business in the areas of organic seeds, organic products, organic rice, milk, and poultry, etc., in spite of the major issue of low productivity. *Vrikshayurveda* practices have potential to increase their productivity and quality as well.

5. In Uttarakhand hills, the *Tok* system of land use (growing crops as per the suitability of land) is successful. Accordingly, government of Uttarakhand has adopted the cluster approach for introducing Paramparagat Krishi Vikas Yojna (PKVY) and formed 3100 clusters across the state. The suitable clusters may be identified for doing selection of farmers for introducing and integrating the *Vrikshayurveda* practices in identified crops and villages of different districts of Uttarakhand.

b. Technical Session-II

Dr Sunita T Pandey, during her presentation on "Future potential on the use of *Vrikshayurveda* and traditional practices in hilly agriculture of Uttarakhand State", highlighted the wide use of *Kunapajala*, the first organic fertilizer given to the world by India through Vrikshayurveda, was in use across the various agroclimatic zones of India (Fig.1), and across different times, i.e., from 321 BCE to 1725 CE.

Author	Vrikshayurveda
Cp – Chakrapani Mishra (courtier) (1577 AD)	Vishvavallabha
Sa – Sarangadhara (courtier) (1283–1301 AD)	Upavanavinoda
V – Varahamihira (scholar) (505–581 AD)	Brhat Samhita
S – Surapala (physician) (c. 1000 AD)	Vrikshayurveda
So – Someshvardeva (king) (1131 AD)	Manasollasa
C – Chavundaraya (scholar, poet) (1025 AD)	Lokopakara
BK – Basavaraja of Keladi (king) (1698–1725 AD)	Shivatatvaratnakara

Figure 1. Map of India showing wide use of *Kunapajala* in different agroclimatic zones and across different times.

Dr Sunita Pandey further highlighted that from 1725 CE onward *Vrikshayurveda* was neither mentioned anywhere in our literature nor its uses/practices progressed as a part of our heritage and traditional knowledge. Presently, we are using the organic farming practices introduced by ancient past, though the philosophy and practices of all the methods followed in organic farming have their origin in *Vrikshayurveda* by Surapala (c 1000 CE). She also elaborated the composition of the original, and the modified version of herbal *Kunapajal*a (Table2).

Table 2. Formulation of Kunapajala[1].

Item	Quantity
(1)Animal flesh (fresh or stale, not rotting) *or* Eggs (fresh or old)[2] *or* Soybean meal or nuggets plus *Paneer*[2] *or* Fish Meal *or Paneer*[2]	2 kg 25 1 kg+1 kg 2 kg 2 kg
(2) Marrow (crushed bones) *or* Tofu[2] from soybean	0.5 kg/1 kg
(3) Rice husk *or* any grain husk	1 kg
(4) Available oilcake	1 kg
(5) Cattle dung	10 kg
(6) Cattle urine	15 L
(7) Black gram (optional)	0.5 kg
(8) Honey	0.25 kg
(9) Ghee	0.25 kg
(10) Milk	1 L

1. Developed by YL Nene and SL Choudhary (AAHF).
2. Not mentioned in any of the *Vrikshayurvedas*.

On the basis of discussion and conclusions in the Pre-Workshop Orientation Meeting, she highlighted the important constraints (problems) being faced by Uttarakhand farmers in cultivation of various fruit, vegetable, flowers and field crops in the mountainous areas of Uttarakhand (Table 1). She also explained the potential of various time-tested and time-honoured recipes of *Vrikshayurveda* for plant protection in various crops (Table 3) and for providing nutrition to the crops and soil.

Table 3. Recipes recommended based on *Vrikshayurveda* practices for crop yield increase and disease management.

Disease/Pest	Prescription	Notes
Seed and seedling rots	Prepare 10% cattle dung (dry or wet) slurry with water. Dip the seed for 10 min and sun-dry.	More than one batch of seed can be treated with same slurry.
Leaf and stem blights (fungal)	*Kunapajala* 30% with appropriate herbal (e.g., *Clerodendrum* root extract), ferment (3 days) in cattle urine	Foliar sprays at 10-day intervals, starting before the expected disease incidence.
Downy mildews	*Kunapajala* 30% with mustard + honey + milk, ferment (3 days) in cattle urine	Foliar sprays as above. Instead of mustard, honey, milk, use *Panchamula* ferment in cattle urine as alternative.
Powdery mildews	*Kunapajala* 30% with 68% milk (10%) + 2% honey	Foliar sprays at 10-day intervals starting just before flowering time.

Foliar rusts (not for white rust)	*Kunapajala* 30% + 60% milk + crushed white mustard, ferment (3 days) in urine (10%)	Foliar sprays at I0-day intervals just before flowering time.
Leaf and stem blights (bacterial)	*Kunapajala* (30%) +white mustard (1 kg) + curd (5 kg) in cattle urine (10 L) in a 3-day ferment; final volume 200 L (70%)	Spray at 10-day intervals and after every rain (with winds).
Nematodes (on roots)	Soak seed overnight in a 3-day-old ferment of neem bark and crushed *vidanga* (*Embelia ribes*) seed in cattle urine (70%)	Drenching soil around plant base. Quantity according to size of plant (range 5 to 20 L).
Viral diseases of perennials	*Kunapajala* 30% + 3-day-old ferment of *Clerodendrum* roots and leaves in cattle urine 60% + milk 10%; final volume 200 L	Start spraying weekly as soon as symptoms are visible in some plants or trees; later the sprays can be reduced to 2-week intervals. Alternative: drench soil around trees with 5 L suspension every 2 weeks.
Seed-transmitted smuts (both internally and externally seed- borne)	Soak seed overnight in 3-day-old ferment of milk (50%) and cattle urine (50%)	Dust-cover the seed with dry cattle dung powder so that the seed can be handled easily for sowing.
Leaf diseases (and pests) of trees	Fumigation with a mixture of powdered hair, nails, white mustard oilcake, and/or horns	Place materials on dried cow dung or hemp fiber. Use one to two smoking apparatuses per tree.

Reference: Nene YL (2012), Asian Agri-History Vol. 16, No. 1, 45-54.

Besides this, Dr Sunita Pandey also explained various *Vrikshayurveda*-based formulations to protect the crops from various insect pests and also some of the formulations to improve the quality and yield of tea (*Dhanyagavya*, Ind-Safari, etc.). She also highlighted the performance of various crops (paddy, chickpea intercropped with wheat, chili and marigold as boarder crop and a very important aromatic crop *tulsi* or Holy Basil) grown under the *Vrikshayurveda*-based formulations in the demonstration trails at NEBCRC and Medicinal Research and Development Centre (MRDC), respectively at GBPUA&T, Pantnagar during *Kharif* of 2018-2019 season (Fig. 2, 3 & 4).



Fi. 2, 3 & 4. Dr SPS Beniwal and Dr Sunita T Pandey observing demonstration and experimental trails on *Vrikshayurveda*-based practices in rice at NEBCRC and in *tulsi* at MRDC, GBPUA&T, Pantnagar.

7. Success Stories on the Use of Vrikshayurveda-based Preparationsin Kerala and West Bengal (Two Chapters of AAHF)

Two experts, one, Sri CV Jidesh, Vrikshayurveda expert from AAHF's Kerala Chapter, and the other, Sri Vijay Parmar, Vrikshayurveda expert for tea cultivation from AAHF's West Bengal Chapter, were invited to the workshop to share their experiences of their successful work on diferent crops in different areas of Kerala, and tea districts of Darjeeling and Dooars of norhtern West Bengal, respectively. They both made presentations on their work which were found very educative and were very much appreciated by the worshop participants. Their success stories are presented here.

7.1 *Vrikshayurveda* Extension Programme in Kerala and its Success Story

By CV Jidesh, Agriculture Officer, Kerala State Department of Agriculture

Sri Jidesh came to know about the use of *Vrikshayurveda* practices in agriculture in a National Workshop on Vrikshayurveda organized by the State Planning Board, Kerala in September 2015 followed by hands-on training for preparation of *Kunapajala* described in *Vrikshayurveda* by Surapala. Mr Jidesh having been immensely impressed with the *Vrikshayurveda* practices wanted to disseminate them as alternate agriculture system. Immediately after the workshop, he conducted a trial in rice crop using herbal *Kunapajala* and cow urine-based bio-pesticide near Amakkavu in Nagalassery Panchayath of Palakkad District by an Agricultural Officer of Nagalassery. From this trail, the rice cultivar "Uma" was marketed as *Vrikshayurveda* rice in January 2016. The same kind of success was observed in field trials of vegetable crops mainly cucumber, cowpea, brinjal, Amaranthus, bitter gourd, snake gourd, lady's finger (*bhindi*), watermelon, ash gourd, pumpkin, etc. during December 2015 onwards in 70 ha of land in Chal (the Safe to Eat Vegetable production zone) of Azhikode Panchayat of Kannur District. Farmers realized the effect of these concoctions in enhancing vegetative crop growth as well as improving quality of the produce. Foliar applications of herbal *Kunapajala* also resulted in reduced incidence of sucking pests like black aphids in cowpea, and pumpkin beetle in cucumber and pumpkin.

State Government of Kerala has its very effective extension network to disseminate agriculture technology besides ICAR's KVKs, Universities' KVKs, and NGO's KVKs. Kannur district has been divided in 11 blocks having 8-10 Gram Panchayats in every block, and thus has a total of 89 Gram Panchayats in the district, each with approximately 20 wards. Every Gram Panchayat is highly empowered through an office known as Krishi Bhawan of that Gram Panchayat. During June 2016 onwards, Shri Jidesh was instrumental in popularizing *Kunapajala* preparation in all the 89 Panchayats of Kannur District, and organized more than 130 trainings in Kannur, Kasaragod, Kozhikode, Kollam, and Trivandrum Districts till March 2018. The popularization of *Vrikshayurveda* in Kannur District was done by organizing training programmes at the Regional Agricultural Technology Training Centre (RATTC) in a phased manner. The participants included Agriculture Officers, Agriculture Assistants, Block Technology Managers, and Field Assistants under the Agricultural Technology Management Agency (ATMA) and the Lead Farmer-Centered Extension and Advisory Service (LEADS) programmes. The training programmes were followed by Block-level hands-on training organized by the Assistant Directors of various Blocks of Kannur District. There were 100 to 150 farmers participants in each training programme. Similar training to

farmers was also imparted through RATTC, Kannur. Most of the farmers who attended the 2-day training programs provided training to other farmers of their Panchayats and in other areas as well. These activities were also clubbed with ongoing Agriculture Department Schemes, such as Vegetable Development Scheme, Crop Health Management Scheme, Parmparagat Krishi Vikas Yojana (PKVY), ATMA field demonstrations, LEADS field demonstrations, etc.

7.1.1 Some of the success stories of the farmers in different areas of Kerala state

At present, the groups of farmers in Panoor, Kottiyoor and Mayyil gram panchayats are using Vrikshayurveda technology, i.e., application of herbal K*unapajala* and cow urine-based bio-pesticide in various vegetables crops, flower crops, and the rice crop. Farmers of Chelora panchayat are getting excellent results of Vrikshayurveda practices in their jasmine farm from 2017 onward. They are getting profuse floral buds production with enhanced aroma quality, appearance and shelf life of jasmine flower. Their daily income has increased to Rs. 500 due to enhanced performance of jasmine flower quality and quantity because of application of *Kunapajala* and cow urine-based bio-pesticide. Farmers of Kottiyoor Panchayat are applying herbal *Kunapajala* through fertigation and also cow urine-based bio-pesticide as foliar application on cowpea, bhindi, chili, and tomato. Farmers are convinced about the beneficial effect of herbal *Kunapajala* in improving crop vigour, health, higher yield and better quality of the produce. They are also convinced about the beneficial effect of cow urine-based bio-pesticide in managing caterpillars as well as sucking pests of these crops. Farmer trainers are now providing training to the farmers of other areas, and helping in popularizing *Vrikshayurveda* practices among farmers. Farmers of Pariyaram Panchayat are highly satisfied with the use of *Vrikshayurveda* technology and growing vegetables (cowpea, chili, cucumber, pumpkin, Amaranthus, snake gourd, bitter gourd, ridge gourd, watermelon, ash gourd, and *bhindi*) using herbal *Kunapajala* through fertigation and cow urine-based bio-pesticide. Besides being organic manure, herbal *Kunapajala* is very effective in managing black aphids in cowpea and pumpkin beetles in cucumber and pumpkin, and also sucking pests in chili. The excellent results were obtained by the farmers in rice crop with the application of herbal *Kunapajala* and cow urine-based bio-pesticide. The concoction applied managed all the insect pest and diseases of the rice crop and also protected the crop from

Three months of after application (2017) of Herbal Kanapajal, Kannur

On 14-01-2018 seen Farmers Sri Shaji & Sri Johny, Kannur

drought. Rice farmers of the areas are now convinced and have adopted all these traditional wisdom practices in a big way. Vedic rice of Mayyil was launched on 9 March 2018.

The Kerala Chapter of AAHF is motivating the farmers by conferring "*Vrikshayurveda* Awards" for adopting the *Vrikshayurveda* technology in their fields and to journalists for giving excellent coverage to the *Vrikshayurveda* technology events among the farmers and other concerned. Gram Panchayats are also running Bio Shops to sell bio-products and organically grown produce at the Panchayat level. Good organic standards are maintained by a spy mechanism of Agriculture Officer with the help of other social and official informatics of the Gram Panchayat.

The successful use of Vrikshayurveda practices, namely, *Kunapajala*, a fermented liquid manure, and cow urine-based bio-pesticide in different crops in different districts of Kerala is highly relevant to the situation in Uttarakhand, which is also characterized by cultivation of different types of fruit, vegetable and field crops like the Kerala state, and thus have tremendous potential for use in Uttarakhand state.

7.2 Success stories on organic tea cultivation in Darjeeling and Dooars districts of northern West Bengal through the use of Vrikshayurveda-based concoctions

Sri Vijay Parmar, CEO, Mittal Group of Tea Gardens, Siliguri, West Bengal, and Chairman of West Bengal Chapter of AAHF

Sri Vijay Parmar shared his successful experiences on using Vrikshayurveda-based concoctions in tea gardens of Darjeeling and Dooars districts of northern West Bengal. He narrated a successful story of the potential and tremendous usefulness of Vrikshayurveda-based Herbal and Non-herbal concoctions for converting conventional Inorganic tea gardens into Organic tea gardens by their successful use in the Darjeeling and Dooars districts of northern West Bengal. He emphasized that conventional gardens have very high spraying costs per hectare to control pests and diseases compared to very low cost of pest and disease control with concoctions made out of herbs, seeds and weeds which is very low. Tea produced from tea plants treated with Vrikshayurveda concoctions are free of pesticides, and safe to consume. He further emphasized that by practicing the various Vrikshayurveda techniques we can reduce the ill-effects of the climate change: (i) the use of Vrikshayurveda practices has potential to increase the water holding capacity of the soil considering the irregular rainfall distribution and pattern necessitating the need for Irrigation, (ii) Vrikshayurveda practices help in combating drought by mitigating the effects of longer dry spells, (iii) Vrikshayurveda subscribes to preserving the water bodies and planted trees which help to conserve water, (iv) Vrikshayurveda helps in building the immune system of the tea bushes as the bush immune system is weakened due to high use of chemical fertilizers, pesticides and herbicides, (v) Use of Vrikshayurveda practices helps in buildup of soil microbial populations and prevent degeneration of soil (soil erosion), (vi) Change in weed flora due to use of herbicide - Vrikshayurveda practices help in generation of soft weeds which are easy to cut manually as compared with change in weed flora due to the use of herbicides, and (vii) Vrikshayurveda practices help in preservations of predator populations which are lost due to heavy pesticide use. Shri Parmar

presented the standard recommendation of Vrikshayurveda preparations for enhancing the quality of tea production, viz., foliar sprays of Ind-Safari for control of all sorts of insect pests, and in particular the Looper caterpillar. This fish preparation works as nitrogen fixer, and promotes growth via the amino acids broken down from the fish protein by the fermentation process. Above all, it is also cheap as one drum of Ind-Safari will be able to protect 80 ha of tea area and costs not more than Rs 1000 per 200 L drum of readymade of concoction.

Sri Parmar also emphasized the use of cow urine to ferment *Polygonum,* a weed with swollen knobbly (lump) joints up its stem that is found in abundance in the tea-growing regions of the Northeast India. The resulting liquid is sprayed against Red-spider mites. He highlighted that an effective control of tea mosquito bug (*Helopeltis theivora*) can be obtained by cow urine fermented solution of *Vitex negundo* and *Clerodendrum infortunatum* plants, commonly found growing by the roadside across West Bengal, Nepal, and the Northeast. This concoction is so effective in controlling the tea mosquito, formerly the bane of our tea plantations, that the workers call it a "magic plant." Although these concoctions drive the pests away, the best thing about them is that they make the bush immune. In Darjeeling area, where Blister blight is even bigger a problem than the tea mosquito bug, we have developed a formula to effectively control it by boiled *Equisetum* (Common horsetail or *Kurkuray*), foliage of the Casuarina (Ironwoods) tree, rice husk or anything else containing silica.

He also explained several herbal concoctions useful in the control of different tea pests. Some very useful concoctions have been successfully made and are being successfully used on commercial scale in the Organic Tea Gardens, under the guidance of the Agri-History Foundation, Rajasthan Chapter of AAHF, and now the West Bengal Chapter of AAHF. *Polygonum hydropiperoides* (Swamp smartweed) /*Persicaria chinensis* (Chinese knotweed) / *Persicaria oriantalis* (Prince's Feather) is successfully used for the control of mites in tea. These three *Polygonum* species are found in abundance in the tea growing regions of the Northeast. Their local names are Thotanay, Ratnoyala or Satgathia, respectively. Piro-Onio/Bitter Fern Concoction (POC) is very useful for insects such as thrips, green fly, *Heleopeltis*, and other minor insects. This grows in the damp areas within the Tea Gardens and is treated as a weed. Garlic and red chili concoction (GCC), provides good control of all types of Insect-pests and caterpillars. *Equisetum* (Horsetail) or rice husk concoction (ERHC) very rich in silica to control blister blight and black root rot and other fungus diseases. Neem seed concoction (NSC) provides a fair control of all sorts of insect-pests.

As in case of Kerala state, the successful experiences of the effective use of *Vrikshayurveda* concoctions in converting the conventional inorganic tea gardens to organic tea gardens in Darjeeling and Dooars districts of northern West Bengal are very relevant, have tremendous potential and merit for its application to improving the tea gardens of Uttarakhand state. The use of Vrikshayurveda-based preparations will certainly help in the regeneration of Tea Gardens of Uttarakhand state.

7.3 Summary of Discussions and Recommendations of the Technical Sessions

Detailed discussions followed technical presentations in which the participants especially farmers actively participated and raised pertinent queries relating to their crops and problems of their areas. Based on these discussions and conclusions during the 2-day Workshop, there was a general agreement on the following and could be considered as Workshop Recommendations.

(I) The traditional Vrikshayurveda-based knowledge and practices, unearthed by the Asian Agri-History Foundation (AAHF), which offer a good solution to replenish our presently nutrient- and microbes-depleted soils, have a great relevance, potential and merit for use for the eco-friendly sustainable farming of the smallholder farmers of the hilly areas of Uttarakhand, and thus should be adopted and religiously followed to make our farming eco-friendly and sustainable for now and the years to come.

(ii) The fermented liquid fertilizer – *Kunapajala* - described in Surapala's Vrikshayurveda (c. 1000 CE) can be extremely useful and effective in ensuring proper crop/plant nourishment and their protection from insect-pests and diseases in an eco-friendly manner, and in maintaining good soil health, and thus helping in increasing crop productivity as clearly demonstrated by AAHF's practical experiences in Darjeeling and Dooars tea gardens of northern West Bengal, and the state of Kerala.

(iii) A total replacement of their present high-input approach by the traditional Vrikshayurveda-based practices is achievable in case of the smallholder farmers through the use of *Kunapajala* and bio-pesticides, however, the traditional Vrikshayurveda-based practices should be integrated with the modern scientific approach followed by the medium- and large-scale farmers. This should ensure reduced or judicious use of chemical fertilizers and pesticides, which would be in line with the Central Government's policy of reducing the use of urea in the country by 40%.

(iv) The use of Kunapajala can enhance crop productivity of "Jaivik Kheti", as lower crop productivity was highlighted as a problem being faced by the Uttarakhand farmers who have been practicing it for the last several years.

(v) A project proposal for initiating validation research and technology transfer activities in different crops and areas of Uttarakhand state (as decided in the Pre-Workshop Preliminary Meeting on 1 October and in the Workshop) should be submitted by the Asian Agri-History Foundation to the Ministry of Agriculture of the Government of Uttarakhand.

8. Demonstration for preparation of *Kunapajala* (a fermented liquid formulation of Vrikshayurveda-based practices)

Hands-on training for preparing *Kunapajala* for the workshop participants.

A practical on "How to prepare Kunapajala" was also conducted for the benefit of participants in the morning of 24 October to provide a hands-on training to participants, in which farmers showed a keen interest, raised a number of pertinent questions, and very much appreciated this practical exercise. The students of BSc agriculture studying the course "Agriculture Heritage of India" also participated in this practical, and interacted a

9. Plenary Session

The session was initiated by Prof. Subhash Chandra, Department of Agronomy, by a welcome note. The session was attended by the Vice-Chancellor of GBPUA&T, and Patron of AAHF, Dr Tej Partap, the Chief Advisor to the Chairman of AAHF, Dr MC Saxena, Dean of College of Agriculture, and Co-Patron of AAHF, Dr J Kumar, and Chairman of AAHF, Dr SPS Beniwal.

Dr. Sunita T. Pandey, Executive Secretary, AAHF presented a brief on the Foundation, its past activities, and future plans for Uttarakhand state. The Foundation has broad representation and support of top-rated Indian universities, independent researchers, NGOs, prominent intellectuals, etc., she informed. The Silver Jubilee Celebrations of the Foundation and workshop on *Vrikshayurveda* and Traditional Practices in Uttarakhand State: Present Status and Future are continuum of past and future in the area of agriculture which achieved its success plateau in 70s in form of Green Revolution. Now, it faces a severe crisis. The spade work of an interactive session of farmers, research scientists and extensionists of the university, representatives of agriculture and horticultural departments of all the districts and Tea Board on 1st October 2019 at Pantnagar set the tone for the workshop theme and generated valuable information on crops distribution and their major pests in Uttarakhand. The biphasic interactions among stakeholders led to a realization that a project on Transfer of Technology of *Vrikshayurveda* to the Small and Marginal Farmers of Mountainous Region of Uttarakhand should be submitted by AAHF to the funding agencies. The objectives of the project will be familiarization and introduction of *Vrikshayurveda* practices and its integration in the existing farm practices. The project will cover all the 13 districts of Uttarakhand, its major crops and pests, in phases.

The former chairman of the AAHF, Dr SL Choudhary expressed his satisfaction over the growing interest of farmers in *Vrikshayurveda* due to the curing abilities of pests by many of its prescriptions. Crop-specific 'package of practices' may be developed based on this knowledge He also stressed on translation of many such documents in Hindi, so that, information may reach to the rural stakeholders especially farmers.

Dr SL Choudhary addressing Plenary Session

Dr SPS Beniwal concluding the Plenary Session

The present Chairman of AAHF, Dr. SPS Beniwal thanked the University for all out support in providing space and facilities to Foundation's new headquarters at GBPUA&T and co-organizing the workshop. Being futuristic in approach, he stated that the Foundation is keen on formulating a mega project with GBPUA&T for Uttarakhand that may be financially supported by the State Agriculture Department. The project finds its origin in the need for alternative farming system without any use of chemical fertilizers and pesticides to achieve eco-friendly sustainable agriculture for the smallholder

farmers of the state of Uttarakhand, the limitation of organic farming (low productivity), and potential of *Vrikshayurveda*-based practices (use of *Kunapajala* and bio-pesticides in providing nutrients, protection from pests and improvement of soil health). For larger acceptability of the new concept, Dr. Beniwal emphasized the need of providing training to the stakeholders. He further stressed that young scientists and students must be encouraged through awards and scholarships, respectively, to take up research work in this emerging area. These financial incentives may be competitive to attract best talents.

Dr J Kumar addressing the participants during the Plenary Session

Dr. J Kumar, Dean, College of Agriculture, started his address on an emotional note by feeling the absence of the Founder of AAHF, Late Dr. YL Nene in the current gathering. He emphasized that university acquired the AAHF not accommodated it. He also said that the heritage must be researched for solving the contemporary challenges. Dr. Kumar suggested a roadmap for the project by keeping its budget in research and extension mode. He advised AAHF to protect and sell valuable techniques of this domain. Also, he suggested to raise sufficient funds for the scholarships and grants for the students and staff, respectively, who aspire to work in the field of *Vrikshayurveda*.

Dr. MC Saxena, Advisor to the Chairman, AAHF was emphatic on the implementation of the Action Plan, validation of research results and working out of mechanism of action of the prescriptions, a greater number of scholarships and harnessing of international contacts for both knowledge exchange and fund raising.

Dr MC Saxena, Chief Advisor to Chairman, AAHF, addressing the Plenary Session

The Vice-Chancellor of GBPUA&T, Dr. Tej Pratap assured the Foundation for his support and synergy. He asked both Foundation and University to chalk out joint strategy of association. He observed that success can only be sustained if it is mainstreamed. Scientific reasoning is a must for any concept to succeed, he said by quoting the example of limited acceptance of organic farming. Dr. Pratap wished that in the beginning, 3-4 to areas may be identified for initiating the work. There is also a need to train the manpower and create efficient and assertive extension linkage. He said results of using Vrikshayurveda are known but mechanisms unknown - a need to explore them. There is a strong case to turn agri-history into agri-business.

Dr Tej Partap, Vice-Chancellor addressing the participants during the Plenary Session

10. Finalized work plan based on workshop discussions and recommendations

Based on the recommendations of orientation programme and the 2-day workshop and Plenary Session of the workshop, the following is the outline of the work plan for preparing and submitting as project proposal to Government of Uttarakhand.

Project Title

"Technology Transfer of Vrikshayurveda Practices for Sustainable Agriculture Production of Smallholder Farmers of Mountainous Areas of Uttarakhand"

Project Mission and Objectives

Mission

Ensuring sustainable and eco-friendly livelihood for smallholder farmers of Uttarakhand.

Objectives

- Familiarize and train the smallholder farmers of the project areas with the Vrikshayurveda practices
- Improve agriculture productivity of smallholder farmers of Uttarakhand through introduction of Vrikshayurveda practices to their agriculture including the organic farming
- Reduce cost of production by replacing the use of chemical fertilizers, insecticides, fungicides and herbicides with homemade Vrikshayurveda Herbal *Kunapajala* (a fermented organic liquid fertilizer), and bio-pesticides
- Achieve eco-friendly sustainability of their agricultural production

Project Outputs

- Smallholder farmers of the project areas successfully introduced to the Vrikshayurveda practices
- Vrikshayurveda practices successfully Integrated into the existing farming systems of smallholder farmers of the project areas
- Improved agricultural productivity and increased income of smallholder farmers
- Well trained smallholder farmers on Vrikshayurveda practices in Uttarakhand achieved to ensure continuity of their sustainable agricultural production
- Sustainability in agricultural production of smallholder farmers achieved

Mechanism of Project Implementation

- As a technology transfer project
- Familiarize farmers with Vrikshayurveda Practices through organizing hands-on training to Farmer Groups (clusters) through NGOs and KVKs
- Demonstrations on the use of Vrikshayurveda practices in identified crops in farmers' fields to find solutions to their production constraints in farmers' fields in close collaboration with the farmers and Farmer Groups, NGOs, Ministry of Agriculture of Uttarakhand state (Dept of Agriculture, Horticulture Mission, and Tea Board), and GBPUA&T scientists and KVKs

- Phase wise Demonstrations would be arranged in the areas (districts and locations) and crops given in Table 1 of this report as per the decisions of the workshop
- Supervision and monitoring through follow up visits with stakeholders

Proposed Plan of Work

The following plan of work is proposed:

- This is based on the Pre-Workshop Orientation/Preparatory Meeting held on 1 October, 2019, and deliberations, discussions and conclusions from the two Technical Sessions of the workshop.
- In the 1 October Pre-Workshop Preparatory Meeting at Pantnagar, important field, vegetable and fruit crops of Uttarakhand state together with their important diseases and insect-pests were identified. These are given in Table 1 of this report.

Project areas and crops

- The project would be implemented in different areas of Garhwal and Kumaon Mandals of Uttarakhand as per the discussions held and conclusions drawn during the Pre-Workshop Preliminary Meeting held on 1 October 2019, and during the Workshop on 23-24 October 2019.
- The project areas together with their important crops are given in the following table.

Region	**Area**	**Crop**	**Problem**
Garwal	Narendranagar	Ginger	Rhizome rot
	Jardhar Village	Mandua and other millets	
Kumaon	**Nainital**		
	Jeolikote	Vegetables and Fruits	Shoot gall in Mango
	Ramgarh (Simrar)	Fruits, viz., Peach, Apple	Curling
	Suyalbadi	Peach	Curling
	Ghorhakhal Tea Gardens, Bhowali	Tea	Die-back
	Almora		
	Chauna	Vegetables, viz., French bean, Pea, Capsicum and Tomato	
	Matela	Millets	

Project Partners (Stakeholders)

- Uttarakhand smallholder/marginal farmers
- Directorate of Agriculture, Horticulture and Tea Board of the Uttarakhand Ministry of Agriculture
- NGOs
- GBPUAT, Pantnagar (College of Agriculture and Directorate of Extension & KVKs)
- AAHF

Project Formulation

- A draft project proposal will be prepared by AAHF and GBPUA&T based on the workshop recommendations (on identified areas and crops) and in preliminary consultation with the Ministry of Agriculture of Uttarakhand
- The draft project proposal to be discussed with GBPUA&T scientists and KVK staff, and AAHF Experts
- Consultation of the draft project proposal with NGOs and farmer Groups
- Finalization of the Project proposal
- Submission of the project proposal to the Govt. of Uttarakhand for funding.

Mechanism of Initiation of Project Activities

After approval of the project:

- Meeting at different project sites with respective stakeholders (farmers, NGOs, Agriculture Dept Officials, and KVKs).
- Precise feedback from farmers and understanding of the production problems of the selected crops at different sites.
- Outlining of Vrikshayurveda practices to solve the crop production constraints and explaining to farmers, NGOs, Agriculture Dept Officials, and NGOs.
- Organizing hands-on demonstration on the preparation of Vrikshayurveda Herbal Kunapajala and other relevant products.
- Organize "Farmer Trainers" training programmes in two Mandals for the preparation of Herbal Kunapajala and biopesticides in collaboration with Agriculture Dept Officials, NGOs, and KVKs.
- Application of the Vrikshayurveda practices at different sites by site farmers under the supervision of stakeholders (other site farmers, NGOs, Agriculture Dept Officials, and KVKs).
- Supervision and monitoring through follow up visits by respective stakeholders

Technology Dissemination

- Use of Social Media viz. creation of a "WhatsApp Group on Vrikshayurveda" for different stakeholders of the project.
- Preparation of Videos on different aspects of Vrikshayurveda for WhatsApp and "YouTube" use.
- Publication of "Farmer-friendly" literature, viz., leaflets on different aspects of crop production constraints, "Vrikshayurveda Crop Production" guides for important crops for the use of different stakeholders.
- FM Radio/TV broadcasts/Interviews (with GBPUA&T)
- Organize Awareness Programmes at selected sites (with different stakeholders)

Capacity Building of Stakeholders

- Through organizing "Field Visits" to other sites in the two Mandals of Uttarakhand.
- Through "Field Visits" to other states, e.g., visit to Kerala to familiarize with Vrikshayurveda work on different crops, and visit to Darjeeling areas for Uttarakhand Tea Board workers to see

the use of Vrikshayurveda practices in tea cultivation.

- Through training programmes of KVKs and SAMETI.
- Through training programmes of the Directorate of Agriculture, Horticulture Mission, and Tea Board.

Monitoring and evaluation

- Mid-term and Project completion External Evaluation to see the impact of the project activities would be arranged.
- The Final Completion Project Report will be prepared for the Ministry of Agriculture of Uttarakhand and other project stakeholders.

Based on the mentioned work-plan that was prepared and presented in the workshop in the Plenary Session which was based on the discussions and conclusions and was approved by the participants including the locations of work and their crops, a new project now be developed by AAHF for further discussion and finalization and submission for financial support from the Uttarakhand government. The proposed project, after its approval and receiving funding from the Uttarakhand government, would be jointly implemented by AAHF, GBPUA&T, Ministry of Agriculture (Departments of Agriculture, Horticulture Mission, and Tea Board), and NGOs.

Annexure I. List of participants in the Workshop, 23-24 October 2019, Pantnagar.

A. University Scientists and Officials

Sl.	Name	Designation	Mobile No	Email
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4.	Dr SL Choudhary	Trustee AAHF	9462678993	slchouedhry1946@gmail.com
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Annexure II. Workshop Programme

Day 1: 23 October 2019		
08:30-10:00	**Registration**	
10:00-11:25	**Inaugural Session**	
	Convener:	**Dr RP Singh**, Secretary, UC-AAHF
10:00-10:10	Welcome and Felicitation of Guests at Dais	Dr Sunita T Pandey, Executive Secretary, AAHF
10:10-10:20	Lighting of Lamp	Chief Guest & other dignitaries
10:20-10:40	Welcome, AAHF, & Workshop Objectives	Dr SPS Beniwal, Chairman AAHF
10:40-10:45	Statement	Dr J Kumar, Dean Agriculture, GB PUA&T, & Co-Patron, AAHF
10:45-10:55	Statement	Dr MC Saxena, Trustee, AAHF
10:55-11:00	Statement	Shri Gauri Shankar, Director of Agriculture, UK
11:00-11:10	Statement	Shri Sanjay Srivastava, Director, Horticulture Mission, Director, Tea Board, UK
11:10-11:20	Statement	Dr Tej Partap, Vice-Chancellor, GBPUA&T, Patron, AAHF
11:20-11:25	Vote of Thanks	**Dr RP Singh**, Secretary, UC-AAHF
11:25-12:00	**Inaugural Tea**	
12:00-13:35	**AAHF Silver Jubilee Function**	
	Convener:	**Dr Sunita T Pandey**, Exec Secretary, AAHF
12:00-12:10	Welcome	Dr Gajendra Singh, Trustee, AAHF
12:10-12:35	AAHF:25 Years of Journey so Far	Dr SL Choudhary, Former Chairman, AAHF
12:35-13:00	AAHF: Looking Ahead	Dr CLL Gowda, Trustee, AAHF, and Dr SPS Beniwal, Chairman, AAHF
13:00-13:20	Recognitions by AAHF	Dr SPS Beniwal, Chairman, AAHF
13:20-13:25	Statement by Chief Advisor, AAHF	Dr MC Saxena, Trustee, AAHF
13:25-13:30	Statement by Patron, AAHF	Dr Tej Partap, Vice-Chancellor, GBPUA&T
13:30-13:35	Vote of Thanks	Dr Sunita Pandey, Exec Secretary, AAHF
13:35-14:30	**Lunch**	
14:30-18:00	**Technical Session I: Present situation on the use of *Vrikshayurveda* and traditional practices in hilly agriculture of Uttarakhand State**	
	Chairman:	**Dr MC Saxena**, Trustee, AAHF
	Co-Chairman:	**Dr SN Tiwari**, Director Experiment Station
	Rapporteur:	**Dr Amit Bhatnagar**, SRO, Agronomy
	Convener:	**Dr RP Singh**, Secretary, UC-AAHF
14:30-15:00	Present situation on the use of *Vrikshayurveda* and traditional practices in hilly agriculture of Uttarakhand state	Dr Kewalanand, Retd Professor Agronomy GBPUA&T, Pantnagar
15:00-15:45	Statements of Panelists (15 minutes each)	Sri Vijay Jardhari, Save Seed Movement Sri Gauri Shankar, Director Agriculture Sri Sanjay Srivastava, Director Horticulture Mission (HMNEH), Department of Horticulture & Food Processing, Uttarakhand& Director Tea Board
15:45-17:00	Discussion & Conclusions (to guide plan of Action) Vote of Thanks	
17:00-18:00	**Demonstration on preparation of Kunapajala followed by Tea**	
18:30-19:30	Cultural Programme at Dr Ratan Singh Auditorium, College of Veterinary and Animal Sciences	
19:30-21:00	Dinner at Dr Ratan Singh Auditorium, College of Veterinary and Animal Sciences	

Day 2: 24 October 2019		
10:00-13:30	**Technical Session II: Future potential of the use of *Vrikshayurveda* and traditional practices in hilly agriculture of Uttarakhand State**	
	Chairman:	**Dr SPS Beniwal**, Chairman, AAHF
	Co-Chairperson	**Dr J Kumar**, Dean Agriculture
	Rapporteur:	**Dr A K Tiwari**, Prof Plant Pathology
	Convener:	**Dr Amit Kesarwani**, Asst Professor, Agronomy
10:00-10:45	Successful experiences on the use of *Vrikshayurveda* practices in different crops in Kerala State	Sri CV Jidesh, Directorate of Agriculture Kerala State, and Secretary, Kerala Chapter of Asian Agri-History Foundation (KC-AAHF)
10:45-11:15	Future potential of the use of *Vrikshayurveda* and traditional practices in hilly agriculture of Uttarakhand State	Dr Sunita T Pandey, Prof Agronomy & Executive Secretary, AAHF
11:15-11:45	**Tea**	
11:45-12:30	Statements by Panelists (15 minutes each)	Prof Kewalanand, Retd Professor Agronomy, GBPUA&T Pantnagar Mr Vijay Parmar, CEO, PCM Group of Companies Dr SL Choudhary, Former Chairman, AAHF
12:30-13:30	Discussion & Conclusions (to guide Plan of Action)	
13:30-15:00	**Lunch**	
15:00-17:00	**Plenary Session**	
	Chairman:	**Dr Tej Partap**, Vice-Chancellor GBPUA&T, Pantnagar, and Patron, AAHF
	Co-Chairman	**Dr MC Saxena**, Chief Advisor, AAHF
	Rapporteur:	**Dr J Kumar**, Dean Agriculture GBPUA&T, Pantnagar, and Co-Patron, AAHF
	Convener:	**Dr Subhash Chandra**, Professor, Agronomy
15:00-15:30	Plan of Action for Activities (to be jointly implemented by all the stakeholders)	Dr Sunita T Pandey, Executive Secretary, AAHF Dr SL Choudhary, Former Chairman, AAHF Dr Kewalanand, Retd Professor Agronomy
15:30-16:30	Discussion & Conclusions	
16:30-17:00	Remarks Remarks Remarks Remarks Remarks	Dr J Kumar, Dean Agriculture Sri Gauri Shankar, Director Agriculture Sri Sanjay Srivastava Dr MC Saxena, Chief Advisor, AAHF Dr Tej Partap, Vice-Chancellor GBPUA&T
	Vote of Thanks	Dr SPS Beniwal, Chairman, AAHF
17:00	**Tea**	

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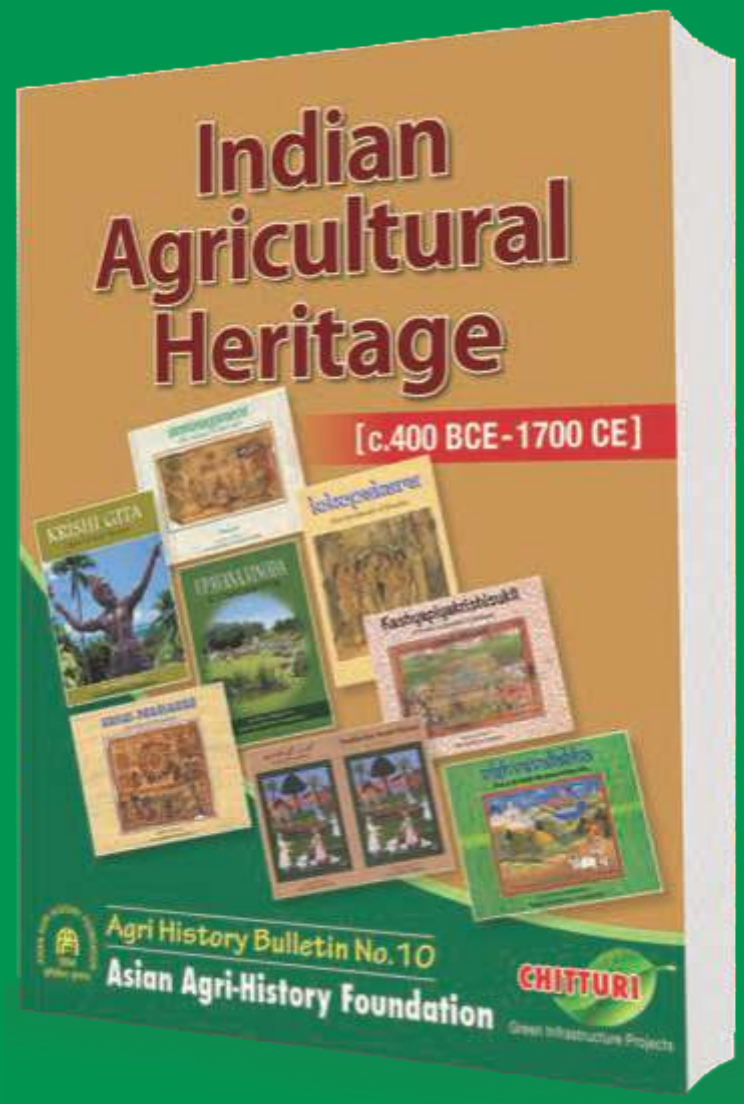

Indian Agricultural Heritage

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