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Kisan Gosthi cum Field Day

ICAR-Central Agroforestry Research Institute, Jhansi has organized *Kisan Gosthi* cum Field Day at village Veerpura, Block-Bamour, Tehsil-Garoutha in Jhansi district on 7th March, 2017. Farmers from village Veerpura (District Jhansi) had participated in the programme. The purpose of *Gosthi* was to create awareness amongst the farmers about coping up the drought situation in Bundelkhand. Various activities *i.e.* farmer awareness programme, Scientists-Farmers interaction and *gosthi* with farmers were organized. The programme was chaired by Dr. R. P. Dwivedi, Principal Scientist (Agril. Extension). Dr. Dwivedi (Coordinator) expressed that farmers should be made aware about the innovations and new feasible technologies so that it will help the farmers in improving their livelihood options and income. Farmers expressed their views on growing of Subabul on bunds and fruit trees along with crops. Farmers also expressed the problems resulting due to drought *i.e.* drinking water, irrigation water, fodder, crop productivity, etc. Anna Pratha (let loose animals) is a major problem informed by farmers. The programme was also Co-coordinated by Dr. Mahendra Singh, Senior Scientist (Agril. Economics), Dr. K. B. Sridhar (Scientist (Forestry), Dr. Dhiraj Kumar, Scientist (Soil Science) and assisted by Sh. Rajesh Srivastava, ACTO of ICAR-CAFRI, Jhansi. The subject wise details were discussed during the brain storming session. Soil water conservation, crops cultivation, fruit, fodder, fuelwood and timber trees were discussed. On the occasion the Soil Health Cards were distributed to 23 farmers of Veerpura village. Farmers were provided technical know-how during question answer session. A multidisciplinary team of Scientists from CAFRI, Jhansi visited the villages and interacted with farmers on problems related to agriculture and agroforestry and suggested the suitable technologies and management practices to get benefit in the cultivation. The farmers were also made aware of alternative systems which can provide maximum benefits in terms of production and livelihood during the drought situation. During interaction and gosthi farm women, rural youth, marginal and small farmers were actively participated in group discussion and question-answer session. Total 125 farmers were participated in the programme.

BARAMASI JACK FRUIT LOCATED IN TIKAMGARH (M.P.)

Jack Fruit (*Artocarpus heterophyllus*) family Moracae is an evergreen tree of tropics. It comes up well in sub-tropics as well upto an evaluation of 1500 m AMSL. The species owe its origin from Malaysia and Western ghats of India. It is largest tree borne fruit in the world. The species has long gestation period of 8-10 years. However, there are some introductions in South India from Singapore and Ceylone that starts bearing fruits in 3rd year after plantation. The species is very common in home gardens of South India. It is well naturalized to sub-tropical conditions of North India. The fruit is consumed as vegetable when unripe and as table fruit after ripening. Later is most common in South India. It is monoecious in nature and possess cauliflorie. In North Indian conditions, jack fruit flowers once in a year. At early ages male catkins appear first which drop down. Female catkins with thick peduncle appear afterwards and set fruit.

Raw fruits are available in the market from April to June. Early mid and lake varieties are common. They vary in size. All existing varieties are local selections. There are no orchards of jack fruits. In Bundelkhand Region, jack trees are not very common. However, they are grown in home gardens and near wells. They require well drained deep loamy soil. A tree with long fruiting span is highly desirable as they fetch good market prize during off season. Such a tree was located in Tikamgarh District of M.P. Part of Bundelkhand Region. The tree is owned by Shri Ambika Prasad Tiwari S/o Late Shri Nand Kishore Tiwari in Old Tehri, Word No. 1, Bunkaryana, Tikamgarh. This tree start flowering and fruiting from September onwards and continues till March-April. As such, marketable fruit are available from November to June. Each fruit weighs upto 4-5 kg. with 30-40 cm. length and 20-25 cm. dimeter. There were average 40 seeds measuring 3.2 cm. in length and 1.8 cm. in dimeter. Ripe fruit has very high TSS (31^{0} Brix). This tree is about 30 years old and over 10 m. tall. Dimeter of the tree at the base is 24 cm.

The farmer attempted to multiply the mother plant by seed. Thus obtained seedling plant is 15 years old and pusses long fruiting span but not yet par with its mother plant. This necessitated need for cloning identified mother plant. Initial attempt in vegetated propagation in mother plant employing soft wood cleft with capping technique should encouraging results. However, time of grafting need to be standardize. Other methods of cloning with air layering need to be attempted. Institute is in touch with the farmer who is equally interested in multiplying the said mother tree. The farmer informed that this mother tree fetches Rs. 3000.00 per year in local market. At normal orchards spacing of 8X8 m., it can fetch over Rs. 4,50,000.00 per ha/year. The tree warrants quick multiplications as it is in great demands.



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Estimation of carbon stock under *Acacia nilotica* trees using generalized models

Acacia nilotica (babool) is nitrogen fixing tree legume that is widespread in Africa and Asia. It is complex species with nine sub-species, of which six are native to the African tropics and three other are native to the Indian subcontinent. It is considered as a very important economic plant since early time as a source of tannins, gums, timber, fuel, fodder and medicines. The main advantage of this genus is its fast biological nitrogen fixation, ability to establish on nitrogen-deficient and drought prone soils and suitability for agroforestry systems.

Generalized models for wood biomass of *Acacia nilotica*

A total of 6 equations on timber biomass of *Acacia nilotica* were found in the literature, two each for Haryana, Uttar Pradesh and Karnataka. These equations pertains to Hisar in Haryana and Jhansi in Uttar Pradesh. In all these equations, diameter at breast height (DBH) was used as independent variable for predicting timber biomass of tree. From these equations, data set was simulated for DBH and biomass, which was then used for developing generalized models at state level.

DBH range for equations of Karnataka was 6.45-10.77 cm, with the simulated data set of DBH and biomass, an equation of type $B = a. D^b$ has been fitted. The model $B = 0.0109 D^{3.2408}$ was found good fit with R^2 value of 0.715. Therefore, this fitted model may be used for estimating biomass of *Acacia nilotica* trees in Karnataka. Similarly, simulated data set for Haryana has been used for fitting generalized biomass model of *Acacia nilotica*. The fitted model $B = 0.2372 D^{1.7248}$ was found good fit with R^2 value of 0.987 for estimating biomass of *Acacia nilotica* trees for DBH range of 3.70-9.90 cm. Similarly, simulated data set for Uttar Pradesh has been used for fitting generalized biomass model

of *Acacia nilotica*. The fitted model $B = 0.7646\ D^{1.7913}$ was found good fit with R^2 value of 0.994 for estimating biomass of *Acacia nilotica* trees for DBH range of 1.20-9.30 cm.

Country Level Generalized Equation for Wood Biomass

Three dataset simulated from state level equations were pooled to get a single dataset on DBH and timber biomass. This dataset was used for developing country level generalized models for wood biomass of *Acacia nilotica*. High correlation coefficient between DBH and timber biomass (0.909) indicated that DBH would be good predictor of biomass. Two types of model were fitted viz. $B = a.\ D^b$ and $B = a + b1.\ D + b2.\ D^2$; where B- wood biomass, D- DBH; but the model $B = 0.36015\ D^{1.59835}$ was found good fit ($R^2 = 0.832$). The fitted curve and statistics for model are given in Table-1 and figure-1. The developed model was validated on an independent data set for predicting biomass. Mean absolute error was found to be 0.54 showing that this model will give an error of 0.54 kg in prediction of biomass. Thus this model may be used for predicting wood biomass of standing *A. nilotica* trees for the DBH range of 1.20-9.90 cm.

Table 1: Fitted statistics for country-level generalized model for timber biomass

Parameter	Estimate	A.S.E.	Param/ASE	Wald Confidence Interval < 95%> Lower	Upper
A	0.36015	0.10082	3.57219	0.15841	0.56190
B	1.59835	0.11281	14.16800	1.37261	1.82409

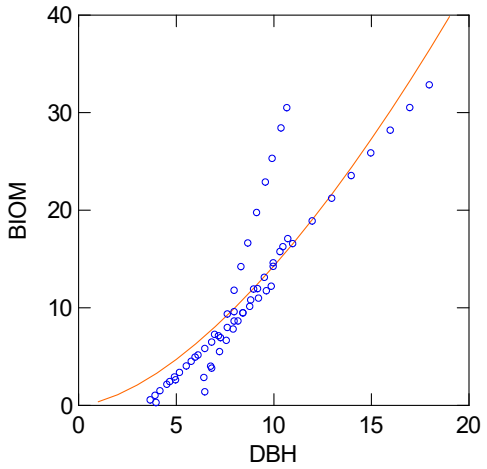

Fig. 1: Fitted generalized model for wood biomass of *A. nilotica*

Estimation of Carbon stock for *A. nilotica* trees

With the help of generalized models for wood biomass, the carbon stock under the *A. nilotica* trees were estimated using the following approach:

- Aboveground biomass was calculated by taking Stem biomass as 45% of aboveground biomass.
- Both stem and aboveground biomass were converted into dry biomass by multiplying with 0.6 (considering 40% moisture loss).
- Carbon stock in stem and aboveground biomass was calculated by formula

- C = 0.48 B, where C – carbon stock (kg/tree), B = biomass (kg/tree).

Carbon stock in stem and above ground biomass was estimated to be 0.67 and 1.48 kg/ tree, respectively for 1-5 cm DBH. This carbon stock has increased upto 5.32 and 7.41 kg/ tree, respectively for 10-15 cm DBH (Table 2).

Table 2: Carbon stock under *A. nilotica* trees for different DBH classes

DBH class (cm)	**Carbon stock (kg/ tree)**	
	Stem	Aboveground
1 - 5	0.666	1.479
5 - 10	2.827	4.007
10 - 15	5.322	7.412

Hence, developed generalized model for wood biomass of *Acacia nilotica* may be used not only for estimation of aboveground biomass but also carbon stock for standing trees.

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Simple and cost-effective technique for enhancing seed germination of *Albizia lebbeck (L.) Benth*

*Albizia lebbeck (L.) Benth (*Leguminosae*)*, widely known by its Hindi name 'siris' is a medium-sized deciduous tree. It is native to tropical Asia and is characterized by having rapid growth, ability to fix nitrogen and improve soil structure (Faisal, et al. 2012). The species is commonly grown as a shade tree in pastures, tea, coffee and cardamom plantations (Orwa, et al. 2009). It is a good soil binder and is recommended for eroded lands and erosion control. This tree is capable of fixing nitrogen in soil and its nitrogen rich leaves are valuable as mulch and green manure (Singh, 1982). *A. lebbeck* is an excellent fuel-wood species with a calorific value of 5200 kcal/g. Its rapid early growth, excellent coppicing ability, site adaptability, and nitrogen fixing capacity have made it a popular species for reforestation of degraded sites, fuelwood plantations and agroforestry systems.

The blocking of water access into the seed is the most common cause of delay in seed germination (Ballard, 1973). The seed coat impermeable to water is a very common type of dormancy in seeds of the Leguminosae family. The seeds of *A. lebbeck* have been

observed to exhibit physical dormancy due to hardness of the seed coat. Raising the seedlings from such seeds become a problem due to delayed and poor germination. The methods to overcome physical dormancy of seeds are acid scarification, mechanical scarification and immersion in water (Baskin and Baskin, 2004). Acid scarification and mechanical scarification are costlier and laborious methods. Hence, an experiment was conducted to develop a simple and cost-effective method for attaining assured and good seed germination of *Albizia lebbeck.*

A study was carried out in the lab of ICAR-CAFRI, Jhansi in order to assess the effects of different pre-sowing treatments on seed germination of *A. lebbeck*. The healthy and matured seeds were subjected to seven pre-sowing treatments laid out using completely randomized design with four replications. The pre-sowing treatments were immersion of seeds in cold and hot water (100°C) for different durations viz., immersion in cold water for 12 h (T1) & 24 h (T2), immersion in hot water and subsequent cooling at room temperature for 12 h (T3) & 24 h (T4), immersion in cold water for 12 h followed by 1 h hot water treatment (T5) & immersion in cold water for 24 h followed by 1 h hot water treatment (T6). Untreated seeds served as control (T0). After giving pre-sowing treatments the seeds were placed in the petri plates and kept in incubator at 29±2°C. Observation on germination was recorded on daily basis for a period of fifteen days from the day of sowing and cumulative germination percent was calculated for each treatment.

The results showed that germination percentage varied among different pre-sowing treatments. Immersion of seeds in hot water and subsequent cooling at room temperature for 12 h (T3) gave the highest germination (96%) followed by T5 (95 %), T4 (94 %) and T6 (93%). The minimum germination (18 %) was observed in untreated seeds (Fig. 1). The results of this study are in agreement with the findings of Mwase and Mvula, 2011 & Azad, et al. 2012 who reported that soaking of seed in hot water softens the hard seed coat and hydrates the seed tissues, thereby facilitating good germination.

From this study, it is concluded that for attaining early and higher germination in *Albizia lebbeck,* the seeds may be immersed in hot water (100°C) which is allowed to subsequent cooling at room temperature for 12 h before sowing. This technology is farmer friendly and can easily be adopted by the farmers and nursery growers as it saves the time and money to raise quality seedlings of *A. lebbeck.*

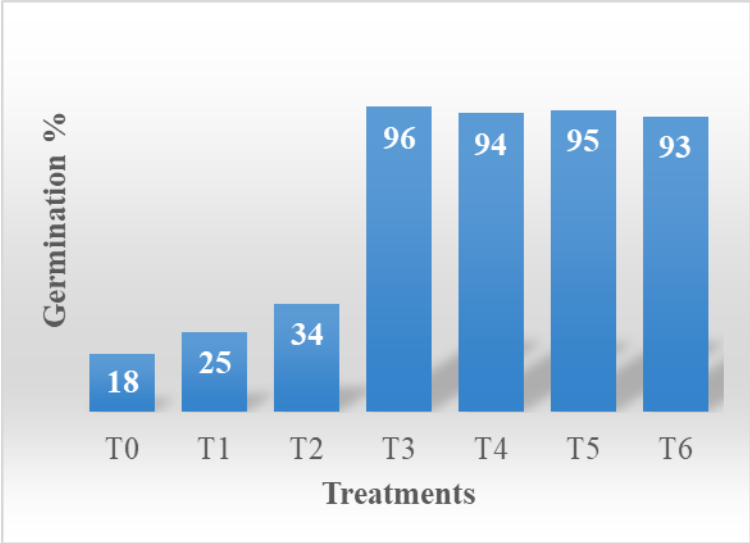

Fig 1: Effect of pre-sowing treatments on seed germination of *A. lebbeck*

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Exhibition

- ICAR-CAFRI, Jhansi participated and exhibited agroforestry stall in **Krishi Unnat Mela-2017** during 15th -17th March, 2017 organised by IARI, New Delhi at New Delhi. Dr Naresh Kumar, Dr Asha Ram and Sh. Rajesh Srivastava from CAFRI, Jhansi participated in this event and demonstrated the Institute's Achievements.

- ICAR-CAFRI, Jhansi participated and exhibited an agroforestry stall at KVK, Bharari, Jhansi on the occasion of Kisan Mela on 17th March, 2017. Dr R. P. Dwivedi and Sh. Ajay Pandey from CAFRI, Jhansi participated in this event and demonstrated the Institute's Achievements.

- ICAR-CAFRI, Jhansi participated and exhibited an agroforestry stall at Mahoba (U.P.) on the occasion of Virat Kisan Mela and Krishi Pradarshani during 25-27 March, 2017. Dr R. P. Dwivedi, Dr Naresh Kumar and Sh. Rajesh Srivastava from CAFRI, Jhansi participated in this event and demonstrated the Institute's Achievements.

Farmers Training

ICAR-CAFRI, Jhansi organized six batches of three days training on "**Livelihood Security through Agroforestry and organic farming"** for farmers and field functionaries of Bundelkhand region under **Pradhan Mantri Krishi Sinchai Yojna**-Watershed Development, State Level Nodal Agency, Govt. of U.P., Lucknow. Total 435 farmers and Regional Workers from Lalitpur, Chitrakoot, Banda, Mahoba and Jhansi districts were trained during February and March, 2017. These farmers were exposed to different agroforestry intervention including field visits to on-farm agroforestry intervention in Parasai-Sindh watershed of Jhansi district.

dz-	**Topics**	**Duration**	**Sponsorer**	**Cordinators**	**No of participants**(Farmers &

Ia-					Reginal workers)
1	Livelihood Security through Agroforestry and organic farming	6-8 February, 2017, First Batch	IWMP-I, Jhansi	Dr. O. P. Chaturvedi Dr. Inder Dev Dr. Ramesh Singh Sh Rajendra Singh	30
2		6-8 February, 2017, Second Batch	IWMP-II, Jhansi	Dr. O. P. Chaturvedi Dr. R. K.Tewari Dr. Ramesh Singh Sh Rajendra Singh	30
3		9-11 February, 2017, First Batch	IWMP-I, Lalitpur	Dr. Rajendra Prasad Dr. Ramesh Singh Sh Rajendra Singh	35
4		6-8 February, 2017, Second Batch	IWMP-II, Lalitpur	Dr. Ram Newaj Dr. Ramesh Singh Sh Rajendra Singh	35
5		13- 15 February, 2017, First Batch	IWMP-I, Chitrakoot	Dr. Sudhir Kumar Dr. Ramesh Singh Sh Rajendra Singh	25
6		6-8 February, 2017, Second Batch	IWMP-II, Chitrakoot	Dr. Anil Kumar Dr. Ramesh Singh Sh Rajendra Singh	29
7-		2-4 March, 2017, First Batch	IWMP-III, Chitrakoot	Dr. O. P. Chaturvedi Dr. A. K. Handa Dr. Ramesh Singh Sh Rajendra Singh	21
8		2-4 March, 2017, Second Batch	IWMP-I, Banda	Dr. O. P. Chaturvedi Dr. R.P. Dwivedi Dr. Ramesh Singh Sh Rajendra Singh	22
9		6-8 March, 2017, First Batch	IWMP-II, Banda	Dr. O. P. Chaturvedi Dr. Ramesh Singh Dr. Asha Ram Sh Rajendra Singh	30

10		6- 8 March, 2017, First Batch	IWMP-I, Banda IWMP-II, Banda	Dr. O. P. Chaturvedi Dr. Ramesh Singh Dr. R.H. Rizvi Sh Rajendra Singh	26
11		9-11 March, 2017, First Batch	IWMP-I, Banda	Dr. O. P. Chaturvedi Dr. Ramesh Singh Dr. K. B. Sridhar Sh Rajendra Singh	26
12		9-11 March, 2017, Second Batch	IWMP-II, Mahoba	Dr. O. P. Chaturvedi Dr. Ramesh Singh Dr. Naresh Kumar Sh Rajendra Singh	29
13	Livelihood Security through Agroforestry and Horticultutre	16-18 March, 2017, First Batch	IWMP-I, Mahoba	Dr. O. P. Chaturvedi Dr. Ramesh Singh Dr. A. R. Uthappa Sh Rajendra Singh	31
14		16- 18 March, 2017, Second Batch	IWMP-I, Mahoba	Dr. O. P. Chaturvedi Dr. Badre Alam Dr. Ramesh Singh Sh Rajendra Singh	30
15	Processing,Preservation, Storage and Marketing of of irrigated conditions' Agricultutre Produce	20-22 March, 2017	IWMP-III,Lalitpur	Dr. Mahendra Singh Dr. Ramesh Singh Sh Rajendra Singh	36

Retirement

	
Sh. K P Sharma, AAO 31st January, 2017	Sh. Prabhu Dayal, Technical Officer 31st January, 2017

New Staff Member

Sh. Lal Chand, Scientist (Fruit Science) joined the Institute on 14th March,2017.

Human Resource Development

Dr. A. K. Handa participated in Twenty Fifth Biennial Workshop of All India Coordinated Research Project for Dryland Agriculture (AICRPDA) during 18th -19th January, 2017 held at AICRPDA Center, Dr. PDKV, Akola (MH).

Dr. Inder Dev presented an invited lead lecture in International Symposium on " ECO - Efficiency in Agriculture & Allied Research (EEAAR 17)" during 20th -23rd January, 2017 at BCKV, Kalyani (W. B.).

Dr. O. P. Chaturvedi, Dr. Rajendra Prasad, Dr. A. K. Handa, Dr. R. P. Dwivedi, Dr. Inder Dev, Dr. (Er.) Ramesh Singh, Dr. R. H. Rizvi, Dr. Mahendra Singh, Dr. Naresh Kumar, Dr. Asha Ram, Dr. K. B. Sridhar, Dr. Dhiraj Kumar and Dr. C. K. Bajpai participated in National Symposium on "New Direction in Managing Forage Resources and Livestock Production in 21st Century: Challenges and Opportunities" during 3rd – 5th March, 2017 at RVSKVV, Gwalior organized by RMSI, IGFRI, Jhansi.

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