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Studies on production and collection aspects of Mahua (*Madhuca latifolia*) in Jharkhand

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Abstract
Present experiment was conducted on the production and collection aspects of Mahua produce in nine villages of Ranchi, Jharkhand. These villages are situated near by the forest and their livelihood depends upon the collection of NTFP produces from the forest. The study area was surveyed through household survey with the help of predesigned questionnaire using simple random sampling technique with 15% sampling intensity, taking the household as sampling unit. The total number of family found in the study areas are 2868, while the total number of Mahua tree found in the study area was 956. The average one way distance travelled for Mahua flower collection by the villagers of Urghuttu market varied from 0.2km to 3km, by the villagers of Ormanjhi market is from 0.2km to 2.5km and by the villagers of Mandar market is varies from 0.1km to 2.0km. The average time spent to collect Mahua flower by the villagers of Urghuttu market area is more in comparison to other two areas. The time spent on per day basis to collect Mahua seed/fruits by the villagers residing in vicinity of three market areas indicated variation from village to village i.e. 1 - 2 hr. The average quantity of flowers and seeds collected by the villagers of Urghuttu market is from 75- 90 kg/tree and 10-15 kg/tree respectively. The average quantity of flowers and seeds collected by the villagers varied from 70-85 kg/tree and 10-15 kg/tree respectively. The total quantity of flowers and seeds collected in a season by the villagers varied from 178.50-238.50qtl. and 23.80-39.75qtl. respectively. The sale price of Mahua flower varied from Rs. 15.00-22.00 and Rs. 10.00-15.00 for seeds. The revenue generated by the sale of flowers varied from Rs. 2124.00 - 2718.00 by the villagers of the study area.

Keywords: Mahua, Urghuttu market.

Introduction
Jharkhand literally means ‘land of forest’ where forests play a key role in the economic, cultural and social systems and the entire lives and livelihoods of a majority of the people revolve around forests and forestry particularly on NTFP. Forest based livelihoods mainly consisted of collection, processing and utilization/selling of various NTFPs throughout the year along with some seasonal subsistence agriculture in the forest fringe areas. It is estimated that more than 1 million people depend on forest for their livelihood support in world. Besides, 350 million people derive significant income from various forest produce extracted from forests and tree crops (ITTO, 2000) and in India nearly 500 million people living in and around forest rely on forest produce (World Resource Institute, 1990). Neuman and Hirsch (2000) and Campbell and Luckert (2002) showed that NTFPs contribute from over 50% of the total livelihood income in some areas to less than 20% in others. For the past three decades, there has been a growing awareness of the importance of NTFPs especially for food and medicinal uses. This growing awareness is not only for the role they play in the subsistence economy, but also for their potential and real contribution to the economies of many developing countries (FAO, 1998). Livelihood enhancement interventions for any of these communities, thus has to begin with a thorough understanding of the types, amounts, availability and processing/storage/marketing methods of the major NTFPs in their region. Also, the same NTFP might have different issues/constraints and market dynamics associated with it in different regions. So, it is important to analyze NTFP related issues not only at the state/regional level, but also at micro-level i.e. at village/cluster levels to get a clear understanding of the issues, the value chain and the potential for commercialization and income enhancement.

Madhuca longifolia, commonly known as Mahua, is a tropical tree found largely in the central and north Indian plains and forests. It is a fast growing tree that grows to approximately 20 meters in height, possesses evergreen or semi-evergreen foliage. It is adapted to arid environments, being a prominent tree in tropical mixed deciduous forests in India in the states of Chhattisgarh, Jharkhand, Uttar Pradesh, Bihar, Madhya Pradesh, Kerala, Gujarat and Orissa (Panda *et al.*, 2010). Mahua has a special status among NTFPs as it is linked to the tribal

livelihood systems in different ways. Apart from meeting food and other requirements, it is also an important source of seasonal income. Its flowers are used to brew country liquor which is very popular in the tribal areas of the country. The tree has religious and aesthetic value in tribal culture. In Jharkhand Mahua provides very useful food components as well as a source of income to the villagers, thus helping in livelihood, which is paid less attention earlier in a systematic way. There is a great scope for value addition through forest based small scale & large scale enterprises and is expected to increase both the income and employment opportunities for the rural & tribal people. Therefore, present study was undertaken to study the production and collection aspects of Mahua produce as one of the important NTFPs in and around Ranchi districts of Jharkhand.

Materials and Methods

The present experiment was conducted in nine villages (Gashwey, Surid, Salhan, Kulhi, Kucchu, Gurhu, Naro, Kanijari, Mahuajari) and three markets adjacent to it, i.e. Urghuttu, Ormanjhi and Mandar of Ranchi district located in its three blocks. All the sites are located in agro-climatic sub-zone V of Jharkhand. These villages are situated near by the forest and livelihood of villagers partially depends upon the collection of NTFP produces from the forest and by sale of Mahua produce in market. A reconnaissance survey of the study area with 15% sampling intensity was conducted taking the household as sampling unit. On the basis of the literature review and observation of reconnaissance survey a questionnaire was developed for survey and collection of data using simple random sampling technique. Data collection is done through interviewing household surveys, field surveys and market surveys. The production potential of dependent forest was studied by field survey work.

To obtain the data both formal and informal surveys were conducted. While the informal survey, and key informant interview provided qualitative information, household survey using the formal questionnaire was conducted to obtain quantitative information. The questionnaire includes question on household characteristic such as age, educational level, number of households, monthly income and income from different Mahua produce, the collectors and sellers was asked about his knowledge and the uses of different Mahua produce, to assess which produce the villagers were familiar with and whether they used these products. For each type of produce, their uses, the time of the year these produce were available, status of these products in the villages and nearby forest, and marketing of produces, etc. were collected. The sampled households were also asked to give estimates of produce collected, amount sold and amount consumed at household level.

Results and Discussion

Data regarding production and collection aspects of Mahua tree in selected area is given below.

Village wise inhabitant family and availability of Mahua tree

The number of family in each village and availability of Mahua tree in the surrounding area is presented in the Table 1. Perusal of data has indicated that number of families residing in different village viz. Surid, Geswe and Salhan under Urghuttu market locality; Kuchu, Kulhi and Gurhu under Ormanjhi market and Naro, Kanijari, Mahuajari under Mandar market, varied from 105 to 535. The total numbers of families residing in the study areas were 2868. Among the villages the highest numbers (535) of family belong to Kuchu followed by Naro (500) and the minimum number of family belongs to Surid (105). The total number of Mahua trees observed in study area was 956. Out of which, maximum number of Mahua tree (265) was found Geswe village, whereas the least number (27) of Mahua tree was found in Gurhu village. Panda *et al.,* (2010) reported that about 75% of total tribal households in India are engaged in collection of *Mahua* flower this indicating about 7.5 Million people are in this livelihood activity. The two dominant castes namely OBC and ST were involved in collection of Mahua produces.

Table 1: Village wise inhabitant family and availability of Mahua tree

Sl. No.	Market	Village	No. of family	Total no. of Mahua trees
1	Urghuttu	Surid	105	238
		Geswe	380	265
		Salhan	112	240
2	Ormanjhi	Kuchu	535	53
		Kulhi	420	29
		Gurhu	308	27
3	Mandar	Naro	500	43
		Kanijari	280	28
		Mahuajari	228	33

Collection season of Mahua produce

The collection season varies with the type of Mahua produce (flower and seed) and variation in period of collection was also noted from locality to locality. The collection of Mahua flower in general begins in the mid of March and continues until the mid of May. Among the three markets studied collection of flower firstly stated in Urghuttu area and peak period for Mahua flower collection was observed in the month of April. According to locality collection starts in Urghuttu market area and end lastly in Mandar area. The intensive collection period was 55-60 days during the entire season. Mahua seed collection starts after one to one- and-a-half month when all Mahua flowers have fallen down. The seed collection begins from the month of June and continues until mid of July with a peak season between 15th June to 30th June.

Time spent for collection of Mahua flower

Under this data on various components of collection like time spent, distance travelled and duration of collection are presented in Table 2. Perusal of data indicated that one way distance travelled and time spent to collect Mahua flower by villagers of different markets varied from village to village. The average distance travelled by the villagers of Urghuttu market was from 0.2km to 3km. Generally in all villages under vicinity of Urghuttu market collection of Mahua flowers by the villagers was done from 15th March to 15th May. Similarly, the average one way distance travelled by the villagers of Ormanjhi market areas varied from 0.2km to 2.5km. The period of collection of Mahua flowers by the villagers of Ormanjhi market area was from 20th March to 15th May. The one way distance travelled by the villagers of Mandar market is observed from 0.1km to 2.0km. The period of collection of Mahua flowers by the villagers studied under Mandar market was found from 20th March to 20th May.

The average time spent to collect Mahua flower by the villagers of Urghuttu market area was more in comparison to other two areas. Similar to present study Singh *et al.,* (2005) reported variation in flowering of Mahua genotypes in the

district Panchmahals and adjoining areas that peak period of flowering was earliest (1st week of March) in MH25, while it was delayed in MH 26, MH 29, MH 31 and MH 32 (1st week of April). MH 32 recorded maximum number of flowers and fruits per fascicle. Early ripening, *i.e.* 4th week of May recorded in MH 21, MH22 MH27, MH31 MH 32 and MH 33, while it was noted late (3rd week of June) in MH 23, MH28, MH 34 and MH 35. Dry flower yield ranged from 27-48 kg/plant being highest in MH 32. Fruit yield was found to be highest in MH 32 (98.00 kg/plant). Bhattacharya and Hayat (2004) reported that flowering occurs over 4 to 6 week in the month of March to May, with a collection period of 15-20 days when maximum flowering takes place and income from Mahua varies from Rs. 1000 to 1200 per house hold after 15-20 days of hard work.

Table 2: Time spent, distance travelled & duration of collection of Mahua flower

Market	Village	Distance travelled (one way) km.	Time spent (Hr.) per day	Duration of collection (Month)
Urghuttu	Surid	0.5 to 3.0	8	15th March-15th May
	Geswe	0.2 to2.5	7	,,
	Salhan	0.5 to 2.0	7	,,
Ormanjhi	Kuchu	0.3 to 1.0	6	20th March-15th May
	Kulhi	0.2 to 2.0	5	,,
	Gurhu	0.5 to 2.5	6	,,
Mandar	Naro	0.2 to 1.5	6	20th March-20th May
	Kanijari	0.2 to 2.0	5	,,
	Mahuajari	0.1 to 1.0	5	,,

Time spent for collection of Mahua seeds/fruits

Similar to the flower collection, Mahua seed/fruit is also collected by villagers for extraction of oil as well as to sell in market for the purpose of financial gains. Perusal of data indicated that time spent and period of collection of Mahua seed/fruits by the villagers residing in vicinity of three market areas indicated variation from village to village, *i.e.* 1 hr to 2 hr. Maximum time spent by the villagers of Surid and Salhan village (2.0hrs) followed by Geswe (1.5hrs) from Urghuttu area. On the other hand under the Ormanjhi market area, maximum time spent by the villagers of Kulhu village (1.5hrs) to collect Mahua seed/fruits while villages of Kuchu and Gurhu spent about 1.00hr per day for seed/fruit collection. The average time spent by the villagers of Mandar market was 1.6hrs, where as maximum time spent to collect Mahua seed/fruits by the villagers of Naro village was (1.5hrs) and least time was spent by the Kanijari and Mahuajari villagers *i.e.* 1.0hrs. The duration of collection of Mahua seed/fruits by the villagers of Mandar market was between 1st June to 15th July.

Table 3: Time spent, distance travelled & duration of collection of Mahua seed/fruits

Market	Village	Time spent (hr.) per day	Duration of collection (month)
Urghuttu	Surid	2.0	1st June-15th July
	Geswe	1.5	,,
	Salhan	2.0	,,
Ormanjhi	Kuchu	1.0	1st June-10th July
	Kulhi	1.5	,,
	Gurhu	1.0	,,
Mandar	Naro	1.5	1st June-15th July
	Kanijari	1.0	,,
	Mahuajari	1.0	,,

A study conducted on NTFPs by Negi and Bhalla (2002) reported that collection and marketing of medicinal and aromatic plants is a highly labour oriented activity. And also in report of FAO (1992) showed that In Manipur, India alone, nearly 90% of the population depends on forest products as a major source and some 250000 women are employed in collecting forest products.

Collection Method

Collection of Mahua produces is a very time taking process. A villager spends a lot of time and efforts and faces many problems during the collection of Mahua produce. The time spent on collection of flower was more as compared to seed because Mahua flowers collected one by one by hand from the ground. In general, collection is done in adjacent to village boundary, but villagers did not go in to the deep forest area and they collect only from the fringe area. Collectors start early in the morning, at around 4.30 a.m. in case of flower and 5 a.m. for seed and collected flowers till 11 a.m. to 12 noon and seed collection is done till 6 to 7 a.m. From each family minimum 2 family members were involved in collection, drying and storage. In collection and drying process female involvement are more than male and children are also involved in collection. After collection the flowers were dried in sun on ground for 3 to 4 days then dried flowers are stored in jute bags. The quantity collected by villagers was at the rate of average 2 local baskets (about 40 kg) of fresh flower daily in a season. When these flowers are dried in sun it yields about 300 gm of dry flower per kg of fresh flower. It is also observed that only 60% flowers are collected and rest 40% go waste due to various reasons, *i.e.* eating by cattle's.

Quantities of flower and seed/fruit collected in a season

Total quantity of flowers and seed collected during a season in study villages are presented in Table 4. Perusal of data indicated variation in collection of quantities of flowers and seeds in different under study villages. The average quantity of flowers and seeds collected (kg/tree) by villagers of Urghuttu market area were found from 75kg/tree to 90 kg/tree flowers and 10kg/tree to 15kg/tree seeds. The total quantity of flowers and seeds collected in a season by the villagers of Urghuttu market was found from 178.50qtl to 238.50qtl flowers and 23.80qtl to 39.75qtl for seeds. The quantity of flowers and seeds collected (kg/tree) by the villagers of

Ormanjhi market was found from 70kg/tree to 85 kg/tree for flowers and 10kg/tree to 12kg/tree for seeds. Under Ormanjhi market area maximum quantity of flowers was collected by the village of Kuchu (85kg/tree) followed by Gurhu (80kg/tree) and the minimum quantity of flowers collected by the Kulhi village (70kg/tree), and similar trend was also found for seed. The total quantity of flowers and seeds collected in a season by the villagers of Ormanjhi market area was observed from 20.30qtl to 45.05qtl for flowers and 2.90qtl to 6.36qtl for seeds.

The quantity of flowers and seeds collected (kg/tree) by the villagers of Mandar market area is observed from 70kg/tree to 85 kg/tree for flowers and 10kg/tree to 15kg/tree for seeds. The maximum quantity of flowers collected by the village of Naro (85kg/tree) followed by Kanijari (80kg/tree) and the minimum quantity of flowers collected by the Mahuajari village (70kg/tree). The trend of collection of seed in individual village indicated that maximum quantity of seeds was collected by the village of Naro (15kg/tree) followed by Mahuajari (12kg/tree) and minimum by the Kanijari village (10kg/tree). The total quantity of flowers and seeds collected in a season by the villagers of Mandar market area was from 22.40qtl to 36.55qtl flowers and 2.80qtl to 6.45qtl seeds. Rao and Singh (1996) reported that in south Bihar about 41% families collected Mahua flower. Bhattacharya and Hayat (2004) observed that area for trade of Mahua flower in M.P. was about 5730 MT, in Orissa 2100 MT and on average each person can collect about 70 kg of dry flowers in a good flowering season. In AP about 6188 qtls of Mahua seeds are collected.

Table 4: Total quantity of flowers and seed collection during a season in study village

Market	Villages	Flower		Seed	
		Avg. quantity (Qtl.)	Total quantity (Qtl.)	Avg. quantity (Qtl.)	Total quantity (Qtl.)
Urghuttu	Surid	75	178.50	10	23.80
	Geswe	90	238.50	15	39.75
	Salhan	85	204.00	12	28.80
Ormanjhi	Kuchu	85	45.05	12	6.36
	Kulhi	70	20.30	10	2.90
	Gurhu	80	21.60	12	3.24
Mandar	Naro	85	36.55	15	6.45
	Kanijari	80	22.40	10	2.80
	Mahuajari	70	23.10	12	3.96

Revenue generation by sale of Mahua Flower and seed/fruit

The data on self use & sale of flower and seed per family (kg/year) basis is presented in Table 5. Revenue generated from flower and seed varied from village to village and from market to market. The maximum revenue was obtained by sale of flowers than by the seeds. The sale price of Mahua flower was found from Rs. 15.00 to Rs. 22.00 and Mahua seeds from Rs. 10.00 to Rs. 15.00, depending upon the availability and number of purchasers. On an average the sale price of Mahua flower was Rs. 18.00, while for Mahua seeds it was Rs. 13.00.

Table 5: Revenue generation of respondent family by sale of Mahua flower & seed

Market	Village	Mahua flower			Mahua seed		
		Self-use (kg/yr/ family)	Sale in market (kg/yr/ family)	Amount (Rs)	Self-use (kg/yr/ family)	Sale in market (kg/yr/ family)	Amount (Rs)
Urghuttu	Surid	52	118	2124.00	30	24	312.00
	Geswe	70	151	2718.00	35	32	416.00
	Salhan	60	127	2286.00	30	26	338.00
Ormanjhi	Kuchu	45	108	1944.00	25	35	455.00
	Kulhi	60	105	1890.00	40	27	351.00
	Gurhu	55	85	1530.00	25	29	377.00
Mandar	Naro	70	110	1980.00	40	35	455.00
	Kanijari	65	95	1710.00	35	32	416.00
	Mahuajari	55	115	2070.00	35	25	325.00

The self use of flower and seed per family (kg/year) by the villagers of Urghuttu market was observed from 52kg/tree to 70 kg/family and 30kg/family to 35kg/family for flowers and seeds respectively. In Urghuttu market area the average quantities of Mahua flower & seed sold in market varied from 118kg to 151kg flowers and 24kg to 32kg seeds. Total revenue generated from sale of Mahua flower by the villagers in Urghuttu market, varied from Rs. 2124.00 to Rs. 2718.00. In Ormanjhi market areas, the average self use of flower and seed per family (kg/year) by the villagers varied from 45kg/family to 60 kg/family flowers and 25kg/family to 40kg/family for flowers and seeds, respectively. The average quantity of flowers and seeds (kg) sold in the market by the villagers of Ormanjhi market was observed from 85kg to 108kg and 27kg to 35kg, respectively. Ormanjhi market, the revenue generated by villages from sale of flowers varied from Rs. 1530.00 to Rs. 1944.00. The average self use of flower and seed per family (kg/year) by the villagers of Mandar market was observed from 55kg/family to 70 kg/family and 35kg/family to 40kg/family for flowers and seeds respectively. The average quantity of flowers and seeds (kg) sold in market by the villagers is observed from 95kg to 115kg and 25kg to 35kg respectively. From the Mandar market, the villagers generated money by sale of flowers to the tune of Rs. 1710.00 to Rs. 2070.00.

Similar to present study, Rao and Singh (1996) reported significant contribution of NWFP in tribal/rural economy. It offers employment to about one million people every year. In south Bihar and south western part of West Bengal, the NWFP viz. Mahua flowers and seed, Sal seeds and leaves, Tamarind and Mushroom emerged as major products collected by tribals of this region. Out of total forest revenue of Bihar, about 17% is contributed by NWFP and in West Bengal it is only 1.7% of total forest revenue. In south Bihar about 41% families collect Mahua flowers and in South Western West Bengal about 73% families collect Sal leaves for augmentation of their income. Bhattacharya and Hayat (2004) also reported that income from Mahua varies from Rs 1,000 to Rs 1,200 per household, which requires 15-20 days of hard work. In Orissa on average, each family collect about five to six quintals of Mahua flowers per season, which contributes up to 30% of their annual cash income. It was

estimated that over five million people are dependent on Mahua for a significant proportion of their income. In both states studied, Mahua is generally bartered for daily grocery items, whose value is much more than the actual value of Mahua traded. Mahua collection and trade provides 28,600 person years of employment out of a potential 1, 63,000 person/years.

Conclusion

From the above findings, it can be concluded that out of three weekly markets studied Urghuttu market was observed as rich in trade/business of Mahua products. The social structure of respondent was found from 04 to 12 members, and it is also noted that children and women are involved in collection of Mahua flower/seed. Mahua is widely collected across all of the studied villages for which villagers spent on an average of 15-20 days in summer season. During this period they collect an average of 70-90 kg of Mahua flower and 10-15 kg of Mahua seed per tree/year. Collectors visited the weekly market for selling their produce; otherwise middlemen buy their produce from village. Studies indicate that a household benefited from Mahua between Rs 1500-3000 per year in a season. All three markets (Urghuttu, Ormanjhi, Mandar) surveyed, showed similar patterns of marketing channel, and part of livelihood of villagers of nine villages (Surid, Geswe, Salhan, Kuchu, Kulhi, Gurhu, Naro, Kanijari, Mahuajari) were dependent upon Mahua trade. The availability of Mahua tree is less in study area, which requires enrichment through plantation to additional support to livelihood. Due to lack of storage facility, distress selling prevails resulting into realization of low price among collectors.

References

1. Bhattacharya P, Hayat SF. Sustainable NTFP management for rural development: A case from Madhya Pradesh, India. International Forestry Review. 2004; 6:161-168.
2. Campbell BM, Luckert MK. Towards understanding the role of forests in rural livelihood. In: uncovering the hidden harvest: Valuation methods for forest and woodland resources. Earthscan. London, 2002.
3. FAO. Forests, Trees and Food. FAO, Rome, 1992.
4. FAO. Forestry and food security. FAO Forestry Paper 90. FAO, Rome, 1998, 128.
5. ITTO. A Synthesis Report on the Current Status of Non-Timber Forest Products in the Terai Region of Nepal. Mofsc, Kathmandu, Nepal, 2000.
6. Negi YS, Bhalla P. Collection and marketing of important medicinal and aromatic plants in tribal areas of himachal pradesh. Indian forester. 2002; 128(6):641- 649.
7. Neumann R, Hirsch E. Commercialization of non-timber forest products: Review and analysis of research. Center for International Forestry Research CIFOR, Bogor, Indonesia, 2000.
8. Panda BB, Mishra PK, Thakur R. In: Report of the study on Mahua sub Sector. The Livelihood School, Bhopal, 2010.
9. Rao A, Ratna, Singh BP. Non-wood forest products contribution in tribal economy: A case study in south Bihar and south West Bengal. Indian Forester. 1996; 122(4): 337-342.
10. Singh S, Singh AK, Apparao VV, Bagle BG, Dhandar DG. Genetic Divergence in Mahua (Bassia latifolia) under Semi-Arid Ecosystem of Gujarat. Indian Journal of Plant Genetic Resources. 2005; 18(3):244-249.
11. World Resource Institute. The World Bank in the forest sector: a global policy paper. Summarized In: Wasteland News. 1990; 8(2):6-12.