Concept Note for Bamboo Sector Development in Gujarat

1. *Bamboo*:

Bamboo is an important Non-Timber Forest Produce (NTFP), which grows across the country. Bamboo is a versatile group of plants which is capable of providing ecological, economic and livelihood security to the people. The fastest growing wood plant on this planet: Some species can grow up to 1 meter per day. One can almost "watch it grow". This growth pattern makes it easily accessible in a minimal amount of time. Size ranges from miniatures to towering culms of 60 meters.

A critical element in the balance of oxygen/carbon dioxide in the atmosphere: Bamboo is the fastest growing canopy for the re-greening of degraded areas and generates more oxygen than equivalent stand of trees. It lowers light intensity and protects against ultraviolet rays and is an atmospheric and soil purifier.

A viable replacement for wood: Bamboo is one of the strongest building materials: Bamboo's tensile strength is 28,000 per square inch versus 23,000 for steel. In the tropics it is possible to plant and grow your own bamboo home.

An essential structural material in earthquake architecture: In Limon, Costa Rica, only the bamboo houses from the National Bamboo Project stood after their violent earthquake in 1992. Flexible and lightweight bamboo enables structures to dance in earthquakes.

An enduring natural resource: Bamboo can be selectively harvested annually. Bamboo provided the first re-greening in Hiroshima after the atomic blast in 1945.

Versatile with a short growth cycle: There are over 1000 species of bamboo on the earth. The diversity makes bamboo adaptable to many environments. It can be harvested in 3-5 years versus 10-20 years for most softwood. Bamboo tolerates extremes of precipitation, from 30-250 inches of annual rainfall.

A critical element of the economy:. Bamboo and its related industries already provide income, food and housing to over 2.2 billion people worldwide. There is a 3-5 year return on investment for a new bamboo plantation versus 8-10 years for rattan. Governments such as India, China and Burma with 19,800,000 ha of bamboo reserves collectively, have begun to focus attention on the economic factors of bamboo production.

A renewable resource for agro-forestry products: Bamboo is a high-yield renewable natural resource; ply bamboo is now being used for wall panelling, floor tiles; bamboo pulp, for paper making, briquettes for fuel, raw material for housing construction, and rebar for reinforced concrete beams.

A soil conservation tool: Bamboo is an exquisite component of landscape design. Its anti-erosion properties create an effective watershed, stitching the soil together along fragile river banks, deforested areas, and in places prone to earthquakes and mud slides. The sum of stem flow rate and canopy intercept of bamboo is 25% which means that bamboo greatly reduces rain run-off, preventing massive soil erosion.

An ancient medicine: Bamboo has for centuries been used in Ayurveda and Chinese acupuncture. The powdered hardened secretion from bamboo is used internally to treat asthma, cough and can be used as an aphrodisiac. In China, ingredients from the root of the black bamboo help treat kidney disease. Roots and leaves have also been used to treat venereal disease and cancer. Sap is said to reduce fever and ash will cure prickly heat. Current research points to bamboo's potential in a number of medicinal uses.

Bamboo is integrally involved in culture and the arts: Bamboo is a mystical plant as a symbol of strength, flexibility, tenacity, endurance and compromise. Throughout Asia, bamboo has for centuries been integral to religious ceremonies, art, music and daily life. It is the paper, the brush and the inspiration of poems and paintings. Among the earliest historical records, 2nd century B.C. epics were written on green bamboo strips strung together in a bundle with silk thread. Instruments made of bamboo create unique resonance.

A food source: Bamboo shoots provide nutrition for millions of people worldwide. In Japan, the antioxidant properties of pulverized bamboo bark prevents bacterial growth and it’s used a natural food preservative. Bamboo litter makes fodder for animals and food for fish. Taiwan alone consumes 80,000 tons of bamboo shoots annually constituting at $50 million industry.

As a landscape design element: Bamboo is an exquisite component of landscape design. For the human environment, bamboo provides shade, wind break, acoustical barriers and aesthetic beauty.

Thomas Edison successfully used a carbonized bamboo filament in his first experiment with the light bulb.

2. Bamboo Sector in Gujarat.

Bamboo is found as an **under story** in Moist Teak Forests, slightly Moist teak Forest Southern, Moist Mixed Deciduous Forests, southern secondary Moist Mixed Deciduous Forests, southern Dry Mixed deciduous Forests of Gujarat State.

Out of many species of Bamboos reported from the State, only **two** species ***Dendrocalamus Strictus*** (Manvel) and ***Bambusa arundinacea*** (katas) are industrially most **important** species found naturally in the forests bamboo is also **cultivated** by farmers mainly on the periphery of their farmlands. Bamboo are found in **15** Districts of the state and they are spread over in south Gujarat, **Central** Gujarat, **North** Gujarat and parts of **Western** Gujarat Total area under bamboo in the state is of the tune of **5850 Sq. Kms.** Which forms about **3%** of the total geographical area of the state. Gregarious flowering of bamboos have been reported in Narmada, Dangs, and parts of Tapi, Surat and Valsad districts of South Gujarat in Past few years.

2.1 Legal status

Indian forest Act. 1927 (IFA, 1927) includes plam, bamboo and canes in definition of tree S2(7). The S2(4)b(i) further defines it as forest produce when brought from forests by virtue of being tree.

The PESA 1996 under 4 (m) (ii) confers ownership of minor forest produce to GramSabha. However, the FRA (2006) while defining MFP included bamboo ignoring earlier definition provided in the IFA, 1927.

FRA 2006, further restates the conferment of MFP to Gram Sabha under S 3 (1) (C) as:

> **"…… right of ownership, access to collect, use and dispose of minor forest produce which has been traditionally collected within or outside village boundaries."**

The FRA also define MFP in S 2(i):

"Minor forest produce includes all non-timber forest produce on plant origin including bamboo, brush wood, stumps, cane, tussar, cocoons, honey, wax, lac tendu or kendu leaves, medicinal plants and herbs, roots, tubers and the like:"

Implication being that bamboo and cane are MFP (FRA) and ownership over MFP vests with Gram Sabha (PESA). Though the issue of rights over MFP has been defined in different manner in PESA and FRA, while PESA confers complete ownership over MFP to Gram Sabha but stops short of defining MFP implicating thereby that includes bamboo and cane but requires conferring of specific right with reference to traditional usage and practices.

The Rules made under FRA by GOI vide Rule 2(d) defines the disposal of MFP under clause-c of sub-section (1) of S 3 of Act as:

"shall include local level processing value addition, transportation in forest area through head loads, bicycle and handcrafts for use of such produce or sale by the gathers or community for livelihood."

The R 2(1) (b) defines bonafide livelihood needs of self and family through production or sale of produce resulting from self-cultivation of forest land as provided under cl (a), (c) and (d) of sub-section (1) of S3 of the Act.

Summary of the provisions of the two Acts (PESA and FRA) interpreted with liberal interpretation in favour of local people//Gram /Sabha shall mean

1. Ownership over MFP to Gram Sabha.
2. Right to access, use and dispose MFP to individual.
3. Inclusion of Bamboo and cane in MFP.

The issue on hand is that of inclusion of bamboo and cane in definition of MFP. It is surprising that the legal definition as given in IFA has been undone by FRA for reasons not detailed. It will be relevant to note that PESA stopped short of defining MFP and so it should be presumed that it respected the definition of IFA.

It is in proper spirit to confer right over MFP to local people through Gram Sabha as part enabling act to respect the traditions and customs and traditional usage. It may

be pertinent here to note that the IFA under the process of settlement of right makes similar provision. There may be exceptions to the rule where right to collect MFP has been denied under IFA. Yet it is known that Schedule Tribes and Forest Dweller suffered for want of appropriate mechanism to market MFP from ST&FD for pittance that various state government took initiative to organise trade and provide remunerative prices to primary collectors. There is need to provide for facilitating such arrangement in legally valid manner. Consultation with large number of /gram Sabha and making arrangement for each Gram Sabha as suggested may present operational difficulties high costs and occasionally/frequently make the process unproductively/iterative.

Recent directions

Recent Directions received directly from Hon'ble Minister for Environment & Forest, Government of India, vide his letter dated 21/3/2011 has raised some vital questions. The Hon'ble minister has appreciated concern for conservation of bamboo forests while starting the relevance of bamboo in traditional life it is stated that:

> **"Bamboo forests also serve as important habitats for wildlife. There is hence a pressing need for us to institute a system for conservation of bamboo forests and enable the empowerment of people for people for suitable use and right of this important resource."**

The para a & b on page 2 of the letter list some of the actions required from the state governments:

The para a (2) calls for developing a Management Plan for commercial harvesting of bamboo by Gram Sabha in consultation with Forest Department. Para a (1) requires Gram Sabha be authorized to issue transit pass for Bamboo and MFP. The R 2 (d) FRA clearly states the manner of disposal. In view of same it may not be necessary or desirable to authorise Gram Sabha to issue transit pass. Such an **act may send signal that may Favour CPR syndrome over forest land causing irreversible damage to the ecology of the region.**

The FRA through S 3(i) calls upon the local communities for management and sustainable use of the forest resource. There can be little argument against this.

The need is to evolve mechanism for consultation to provide scientific management while favouring local needs and extending maximized income from revenues to local people, though subordinated to local need.

Working Plan codes needs to be revised to favour wider consultation with Gram Sabha. In the meantime the process needs to be implemented in a manner that favour the spirit of law and does not allow un-sustained extraction as common access resources.

Ownership issue of Bamboo

The debate over definition of bamboo raises a much more basic question of ownership. It may be pertinent to question way the ownership over forest resources is restricted to MFP and not entire produce /revenue. It smacks of assumption that either MFP harvesting has no impact over ecology of forest or the MFP are minor resource over which ownership can be extended while ownership over major resource over which ownership can be extended while ownership over major resource may not be sharable.

In the interest of conservation of forest and the philosophy with which JFM was initiated, it is time to think of total ownership of forest by local communities with adequate safe guards for conservation and sustainability of forests. The issue of bamboo being MFP or otherwise will then be relevant.

Till then the assumption that bamboo access can be allowed with little damage to forest is ill founded and need be addressed effectively rather then making lip services to same.

Bamboo Management

Bamboo is managed on 4 to 5 year felling cycle. The basic principal of management being:

i) To provide Well spaced hygienic environment for proliferation and growth of shoots by resorting to cleaning of clumps.

ii) To provide support to new recruit culms that are week and are likely to break in absence of support.

iii) To optimize yield of matured bamboo for maximum sustained yield.

Other prescriptions include fire control and decongestion of new recruits that result from carpet regeneration.

3. Present Status of Activities

To promote bamboo sector, the State Bamboo Mission (SBM), works under National Bamboo Mission.

Activities of Gujarat State Bamboo Mission for 2014-15

A. Establishment of High Tech nurseries
B. Plantation in forest areas
   - Maintenance of previous years' plantation
   - Improvement of existing stock
   - Plantation in Non-Forest Area
C. Training on skill development using Bamboo resources of
   - Farmers within state
   - Field functionaries / artisans / entrepreneurs
D. Workshops / Seminars/Awareness
   - National Level
   - State Level
   - District Level

4. Required Strengthening

Gujarat has one of the most successful greening programmes in the world. Development of agro- forestry including bamboo provides another opportunity to the state to become global leader in improving tree cover, **initiating a new approach to address global warming and also to evolve a model of rural development** in the of the dream of ***Mahatma Gandhi for "Gramya Swaraj".*** In order to realize this dream, State Bamboo Mission suggest following activities. However, the allocation to the State Bamboo Mission (SBM), is very meagre. There is need to strengthen the State Bamboo Mission.

1. Development postharvest storage and treatment facilities and technologies
2. Bamboo markets
   - Bamboo Marts
   - Retail Outlets(Showrooms) in ten metros
3. Markets surveys
4. Promote research & Development in bamboo sector.

Further, State Bamboo Mission (SBM), Bamboo envisage to take up to following Projects, for achieving the goals of National Bamboo Mission, and

I. Tissue Culture Lab Project

Setting up of a Tissue Culture Laboratory for the mass production of million bamboo plants. Tissue Culture projects is propagation of large quantity of good quality planting materials from elite mother plants within short period of time and space so that farmers can reap the benefits in shortest possible time.

II. Irrigated Bamboo with high productivity, Demonstration Plots.

Technologies will be promoted in bamboo plantation through active involvement of Forest Department and farmers' participatory demonstrations plots to be taken in compact areas of two hectares.

III. Training for skill up gradation in Eastern Tribal Belts.

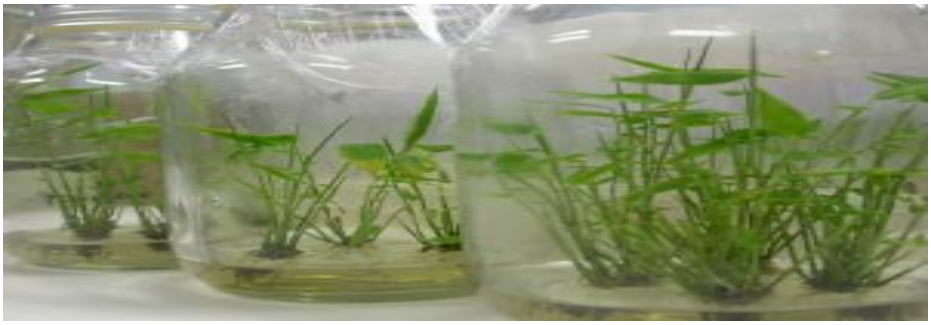
Considering good availability of Bamboo species and its cultivation in the state, it provides a good opportunity for training and developing the local communities for value added activities. This will help amulets poverty of Primitive Tribal Group. Processed and value added products have good demand in the local as well as global markets, and it also provides opportunity to fair earnings. If Primitive Tribal Group (PTG), are trained on along scale. The skill up-gradation of Primitive Tribal Group will improve the products made by Primitive Tribal Group and also improve their marketability.

IV. Bamboo for sustainable employment strengthen Bamboo production and processing by Tribal Artisans and

To generate more income and uplift the living standards of kotwalia and other primitive tribes to popularize bamboo cultivation and usage among local people by engaging in plantation.

V. Technology Transfer Project.

The transfer of technology of technology for making Wood Polymer Composite (WPC), granules and further making products from those granules with a nominal license fee for the technology. This Technology has been developed by Indian Wood Science Technology, Bangalore. If this technology is acquired and shared among different stake-holders techno-entrepreneur bamboo growers this is likely to increase employment revenue and ameliorate poverty in the State through bamboo sector development.



Annex: 1

Bamboo species	Features	Uses
Bambusa balcooa	**Culm**:12-20m height and 8-15cm diameter, grayish green, thick walled, the diameter of the cavity about one-third of that of culm; node thicken with a whitish ring above, hairy brown; internodes 20-40cm long; branch from the lower nodes leafless and hard, mostly spreading, sometimes thorn-like; young shoots blackish green, green with yellow, brown or orange tinged culm sheath, clothed sparsely with dark brown hairs. **Culm sheath:** green when young, deciduous, tapering above and rounded at tip, adaxial surface with densely appressed dark brown hairs, margin ciliate; lower one much shorter and broader than the upper ones; blade 6-8 cm long, 5-7 cm broad, triangular, acute to acuminate, adaxial surface with dark brown pubescence, margin ciliate; ligules 5-8mm high, denticulate, membranous; auricle absent or very small, ciliate.	It the most common use for this bamboo is for structural applications. It is a highly preferred bamboo species for house construction, scaffolding, making ladders and props for small bridges. The shoots are edible in nature with sweet taste. It is also used for Agarbatti sticks and in bamboo wood chip industry. Large quantity of this bamboo species is also consumed in pulp and paper industries.

	Leaves:15-30cm long, 2.5-5cm broad, oblong lanceolate, glabrous above, pale and puberulous beneath,marginsrough,apexpointed,subcordate ,orroundatbasewithshortpetiole	
Bambusa bambos	A very dense tufted bamboo, producing large dense clump of closely packed culms. **Culm:** strong, cylindrical, erect, hollow, dark green-colored up to 30m tall, 15-18 cm diameter, the wall very thick with a lumen; branching at all node, those form the lower nodes recurved and bend downward towards the ground with the upper branches arching and producing a fan like plume, the upper leafy branches bearing small spines. Nodes slightly swollen and few lower nodes produce short aerial roots. Nodes contain a single branch bud at the ridged nodal line. Central dominant branch is produced first, with one or two lateral from the lower nodes, usually the primary and one secondary branch produced at the lower nodes of the culm often spine-like,usuallythreebranches produceat theuppernodes,leafy,with somebranches. **Culm sheath:** sheaths coriaceous, glabrous to pubescent with dark brown velvety hairs. **Leaves:** diffuse in complements, 15-30 cm long and 8-15 mm broad, with about 10 leaves in each complement. Leaf blades linear and variable in size, lanceolate, narrowed to an acuminate tip, with mid-vein inconspicuous on the abaxial side and prominent on adaxial side	This bamboo is utilized as raw material for paper, house construction, panel production and fencing. It is also used for scaffolding, handy craft, furniture, cooking utensils, etc. shoots is used as vegetable and leaves as fodder and medicine.

Bambusa nutans	Medium sized elegant bamboo. **Culm**:6-15m tall, 5-10cm diameter, loosely clumped, much branched above, usually un branched below, straight, green, smooth, not shining, white ring below the node; node slightly thickened, often hairy, lower one bearing rootlets; inter nodes usually 25-45 cm long, thick walled. **Culm sheath**:10-23 cm long, up to 30cm wide at base, with appressed scattered black hairs on the back, base with soft deciduous hairs, top truncate; auricles 2 at the top of the sheath, large wavy, unequal in size, with long bristle. Young shoot yellowish green at apex. Sheathes covered sparsely with dark-brown yellow hairs. **Leaves:**15-25 cm long and 2-3.5 cm broad, linear-lanceolate, acuminate at apex, round and usually oblique at base, upper surface dull green, lower surface glaucous; petiole 3-5mm long, leaf-sheath hairy when young, striate; auricle falcate with few long hairs.	It is use for house construction, paper mat and poles
Bambusa pallida	A caespitose bamboo, growing in thick clumps **Culm**:13-20m high, 5-8 cm diameter, smooth, olive green, covered with white powder; inter nodes 45-70cm long, wall thin. **Culm sheath**:18-30 cm long and 25 cm broad, slightly attenuate upwards and truncate at top. When young, blade often 35 cm long, triangular-acuminate from a broad base covered with apprised white hairs. Young shoots spear-shaped, smooth, sheath green with dark tinge.	This species is used for house building, baskets, mats, toys, wall plates, screen and wall hangers.

Bambusa tulda	A large tufted bamboo **Culm**:up to 20 m high and 8 cm in diameter, smooth; internodes 40-70cm long **Culm sheath**:20-25 cm long and broad, nearly glabrous, rounded at tip, black inside; blade 10-15 cm long, triangular, cuspidate, apprised hairy beneath, rounded at base; ligule 2 mm high, white hairy outside **Leaves**:20-35 cm long and 3-4 cm broad, oblong-lanceolate, base oblique, petiole short; leaf-sheath glabrous or sparsely hairy, ligule short.	It is favoured for handicraft, paper and structural purpose. It is a strong bamboo; it lends itself easily to mechanized processing, and is being used for making bamboo boards and composites.
Bambusa vulgaris	A moderate sized bamboo not densely tufted. **Culm**:8-20 m high, 5-10cm in diameter, bright green, glossy, erect, matured culm yellowish, walls 7-15 mm thick, branching usually form mid-culm to top; nodes prominent, lower ones often with a narrow ring of roots, usually covered with brown hairs; inter nodes up to 15 cm long. Young shoots dark brown to yellowish green. **Culm sheath**:15-25 cm long and 25-35 cm broad, rounded and truncate at top, often beautifully streaked when young with green and yellow, straite, adaxial surface densely covered with thick appressed brown black hairs, edges ciliate; ligule 5-8 mm tall, continuous with the top of the sheath, dentate or sometimes entire, margin ciliate; auricle 2, sub equal, continuous with the blade; blade somewhat triangular, bright yellow, acute, 5-15 cm long and up to 10cmbroad,appressed-hairywith blackhairon theadaxialsurface,margins bristly. **Leaves**:narrow or broadly lanceolate, 15-25 cm long and 2-4 cm broad rounded or attenuate at the base into a 5 mm long petiole, glabrous on surfaces, occasionally sparsely hairy when young, margin scabrous.	This species is commonly used for pulp and paper industries, constructions, scaffoldings, fencing, handicrafts, shoots as vegetable etc.
Dendrocalamus asper	**Culm**:very tall, hallow , 20-30 m high, diameter upto 20 cm, young culm densely pubescent, matured culm very large and very strong and durable, thick walled, swollen nodes, upper internodes longer than the lower, internodes at culm base very short, lower nodes with many aerial roots **Culm sheath**:caduceus in old, sheaths ligules narrow and wavy sheath blade ovate, lanceolate **Leaves**: 5-9 on each twig, pseudo spikelets often in spherical dense clusters at the nodes of leafless branches	This species is mainly cultivated for edible shoot apart from this it is used for construction, paper and pulp, pole etc
Dendrocalamus giganteus	**Culm**:over 30m tall, 15- 25 cm in diameter, often naked at the base, branchy above, nodes hairy; internodes 37-40cm long, covered with white waxy scurf when young **Culm sheath**:As broad at the base as at the summit, 25-50 cm long, glabrous within, clothed with golden or brown hairs, 15-35cm long, often recurved, wavy auricles. **Leaves**: large, broadly lanceolate, rounded at the base30-50cm x 1-1.1cm, cuspidate-accuminate, at first hairy, afterwards glabrous, sheaths striate, ligule long	In north eastern India, the culms are widely used for house building, fencing, as container and various decorative items. In Arunachal Pradesh Mishmi tribe use this bamboo mainly as water container. It is also better raw material for paper and pulp. In Manipur several vegetable products are prepared from tender shoots.
Dendrocalamus hamiltonii	A large bamboo, evergreen or deciduous, **Culm:** ceasptiose, densely clumped, sometimes	This bamboo is one of the commonly used species in

	growing tall and erect, but more often sending out its stems at an angle or curved downwards. Large, 12-20m or up to 25m tall, 10-18.5cm diameter, usually naked below, much branched above. Internodes 30-50 cm long, wall 1.25cm thick, nodes marked with root scares. **Culm sheath**:Long and stiff, variable in size, those of lower part of large culm 35-45 cm long, about 20cm broad. Imperfect blade about ¾ the top of the sheath. **Leaves:** Variable, small on side branches but on new shoots reaching 37.5cm broad rounded at the base into a short thick petiole; leaf sheath covered with white, apprised stiff hairs.	Assam and Nagaland. It is used in house building, construction, making of basket, mats ropes, as container for water, milk and other eatable items. It is also used in paper and pulp industries in large quantity. Some people in North East prepare vegetable, some drinks, and sour pickle from tender shoots.
Dendrocalamus strictus	A deciduous, sub- arborescent, densely tufted bamboo **Culm:**hollow in wet, solid in dry climates, 6-20m tall 2.5-7.5cm in diameter; nodes somewhat swollen, internodes 30-45cm long. **Culm sheath**: Variable; 7.5-30cm long, covered on glabrous, striate, rounded at the top; imperfect blade, triangular hairs on both sides; ligules narrow. **Leaves**:Linear-lanceoclate 2.5-25 X 0.5-3 cm, rounded at the base into a short petiole; sharply acuminate; twisted point, rough and hairy above, softly hair below; leaf-sheaths striate, hairy.	This is one of the most important bamboo species in India. It is found suitable for reclamation of ravine lands. In India it is extensively used for paper pulping and also for constructional purposes. It is used for Agricultural implementations musicals instruments, furniture etc. tender shoots are commonly used as food items. Decoction of leaves and nodes and siliceous matters is used in traditional medicines in India.
Melocanna baccifera	Evergreen bamboo, arborescent, culm diffuse **Culm:**10-20m high; 3-7 cm diameter; green when young and straw color when old; internodes 20-50cm long; wall thin 2-4mm; nodes slightly larger; branches arise from top 1/3rd of the culm; all equal and slender. **Culm sheath**:10-15 cm long, 12-25 cm broad at the base, undulated above, yellowish green when young, yellowish brown when matured. **Leaves**:15-30 X 2.5-5cm long, lanceolate to oblong lanceolate, the apex acuminate with long scabrous, penicillate hairs, base rounded, often oblique.	It is one of the principal species used in house buildings, weaving of baskets and other articles and superior pulp. Fruits are edible. Tabasin an ancient elixir can be isolated from the culm and branches. Prefabricated wall called 'Tarja' or 'Chatai' made from the split culms are used for roofing and walls of huts and temporary barricade etc.
Oxytenanthera parvifolia	**Culm**:up to 20 m high and 8 cm in diameter, dark green, nodes slightly prominent, internodes 20-45 cm long, walls up to 1.2 cm thick. **Culm sheath**:20-23 cm long, 20-25 cm broad at base truncate, striate rounded at top, outer surface with appressed brown hairs, inner surface glabrous, base rounded, ligule broad dentate, imperfect blade 5-7.6 cm long, 2.5 cm broad. **Leaves**:7-23 cm X 1.5-2 cm, linear lanceolate, base rounded, leaf sheath hairy when young, glabrous on maturity.	Local Dimasa, Kuki and other Hill tribes use this bamboo for construction their huts and also for Making baskets, mats, etc