Avoid nodes, use Vietnamese bamboo!

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Introduction

There was a time when Calcutta cane was considered being superior to Tonkin: "… very few professional rod makers will admit that anything can equal first class Calcutta canes." (Frazer 1908, p. 36). The first known importation of Tonkin to the USA by Demarest was just before 1895 and Hardy Brothers began to use Tonkin in 1912 (Simmonds 1956). Several years later, Calcutta cane was out of fashion. It is a common phenomenon when something works well, people hesitate to try something new, even if it could be advantageous. "Fishermen adapt slowly and stubbornly, and insisted on Calcutta bamboo with its darkly mottled sections, instead of Tonkin cane and its pale node patterns." (Schwiebert 1978, p. 944). Nowadays Tonkin is still *en vogue* after 127 years of usage. But is Tonkin the best bamboo for making fly rods? Several textbooks about rod making claim this to be the case. However, there is no evidence for this statement except one. Luis Marden (1997, p. 31) says the Research Institute of Subtropical Forestry of the Chinese Academy of Forestry Science furnished this information: "Tea Stick Bamboo [Tonkin] has the highest fiber content – 53 percent – of all bamboos." Not only its straightness, the fact that the knots are not very prominent, and the good mechanical properties made Tonkin the preferred species of rod construction, but also its good availability. "Its universal adoption by the trade is doubtless due in part to the fact that a large bulk of a uniform and well-prepared product is available on the market." (Simmonds 1956).

Ivor Davies, a former employee from Hardy Bros., told me that in the early 1880s Hardy's first used bamboo in the construction of its "Palakona" range of rods. Tonkin was not selected by chance. Numerous samples from various regions in China were tested in Alnwick for toughness and recovery power. Unfortunately, no record of the species and the exact origin was kept.

Very little is known about other bamboo species and their suitability for rod making. White (1948) states, "In the past few years bamboos growing in the Western Hemisphere have been tested for these special uses. In some cases, certain species, such as *Bambusa tulda* have been found to yield culms from which very satisfactory split rods can be made." Photos show the production of split bamboo rods by Wendt Campbell, Inc., Mayaguez, Puerto Rico.

Yuki Bando's book gives good examples of other bamboo species successfully used for fly rods. He interviewed rod makers in Japan and besides Tonkin and Madake, they are using three other bamboo species (Bando 2020).

Worldwide exist 1,675 bamboo species (Vorontsova et al. 2016). With this natural richness in mind, I travelled to Vietnam. I was lucky to get in contact with the botanist My Hanh Diep, who founded the bamboo village of Phu An, where she gathered over two hundred bamboo species from Vietnam, Laos and Cambodia (Diep et al. 2016). Strolling through this impressive garden facilitated my quest. I preselected species, which looked promising regarding internode length, wall thickness and straightness (fig. 1 to 3). Mechanical properties had to be tested in the laboratory. To collect samples, we travelled to locations where these species naturally occurred (fig.2).

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Fig. 1 Author with samples of single internodes from Viet-1 bamboo, average length 31 inch.

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Fig. 2 Diep My Hanh and Jacques Gurgand sampling Viet-2 bamboo.

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Fig. 3 Viet-2 node, internode length 35 inch, fresh-cut cross-section diameter 2.7 inch.

I included the Vietnamese variety of Tonkin in my test for comparison of its dimensions and mechanical properties. Although it possesses longer internodes than the Chinese variety, they are too short for nodeless rod making. It may be of interest that Hardy Brothers used the Vietnamese variety, which is proofed by a specimen in the Economic Botany Collection of the Royal Botanic Gardens, Kew (catalogue number 33937). During my Vietnam expeditions, I found only wild specimens, but no cultivations, which must have been in existence about a hundred years ago to provide the large amounts of culms needed for the rod production.

The samples were used for two kinds of tests. A scientific test, which gives objective results about the mechanical properties, and a hands-on test, which gives subjective results with rods built from the samples by various rod makers. The tests were conducted independently. The rod makers had no information beforehand about the mechanical properties. I asked them to use a taper, which they knew well, so they could compare the test rod with a rod made of Tonkin or Madake, and to report about their experience regarding building, casting and possibly fishing the rod.

The tests aimed to answer the question if good rods can be made from Vietnamese bamboo. But what defines a good rod? Even if everybody might give a different answer, basically we all strive for rods, which cast and fish well.

If the mechanical properties were sufficient, an outstanding advantage would be long internodes allowing to make rods without nodes. Rod makers could save an enormous amount of time. Moreover, the weak points in a splice could be avoided and node staggering would become obsolete. The morphological structure of a node (fig. 4) makes it impossible for any kind of treatment not to weaken the node to a certain extent.

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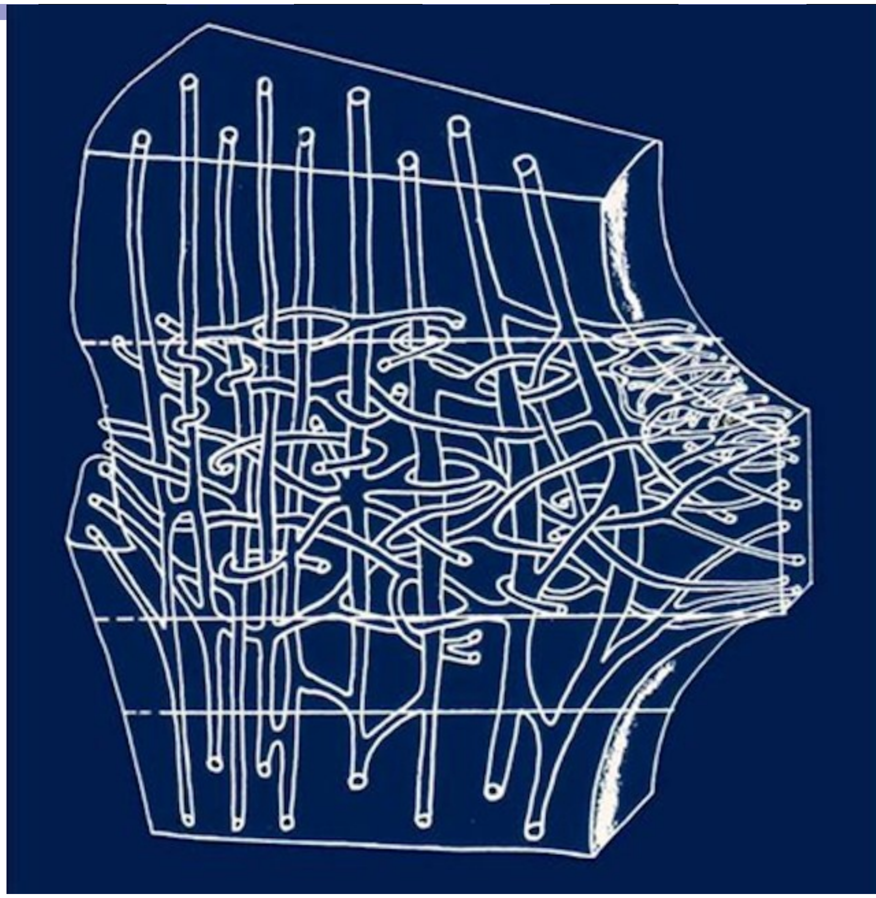

Fig. 4 Illustration of the intertwined vascular bundles within the nodal region of bamboo (Liese 1998)

Scientific test

A scientific test is indispensable to acquire unbiased information. This enables a solid comparison of different species, which is not based on opinions, but on data. Certain prerequisites must be fulfilled in order to perform a three-point-bending-test. Samples of equal size (fig. 5) must be conditioned in controlled chambers with a standard climate (20 °C, 65 % humidity) for about two weeks until constant mass. The bending machine measures the distance and the power, which is required to break

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each sample. One needs a decent laboratory with the appropriate machines to conduct conditioning, three-point-bending-test and measuring the samples with precision (fig. 6 and 7).

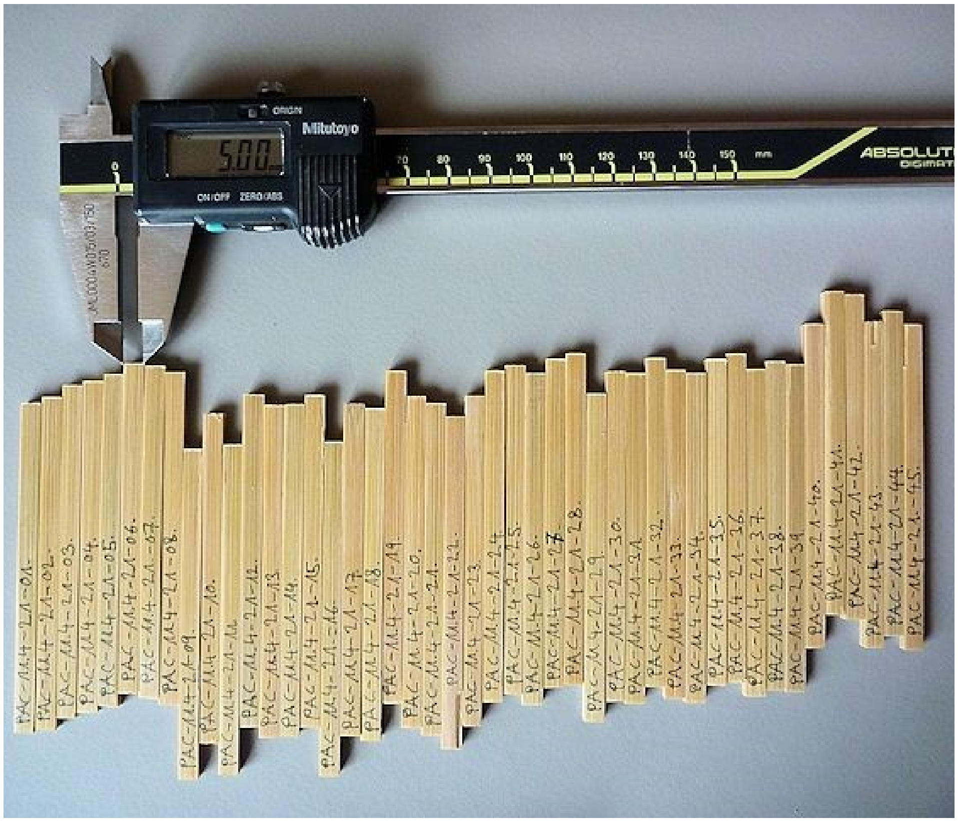

Fig. 5 Hand planed Tonkin samples for three-point-bending test, 3 mm height, 5 mm width, 80 mm length (in inches: 0.118 h., 0.197 w., 3.150 l.). Before bending each sample's dimension and weight is measured individually.

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Fig. 6 Laboratory of the Institute of Wood Science, Universität Hamburg, Germany. Large three-point-bending device behind Goran Schmidt.

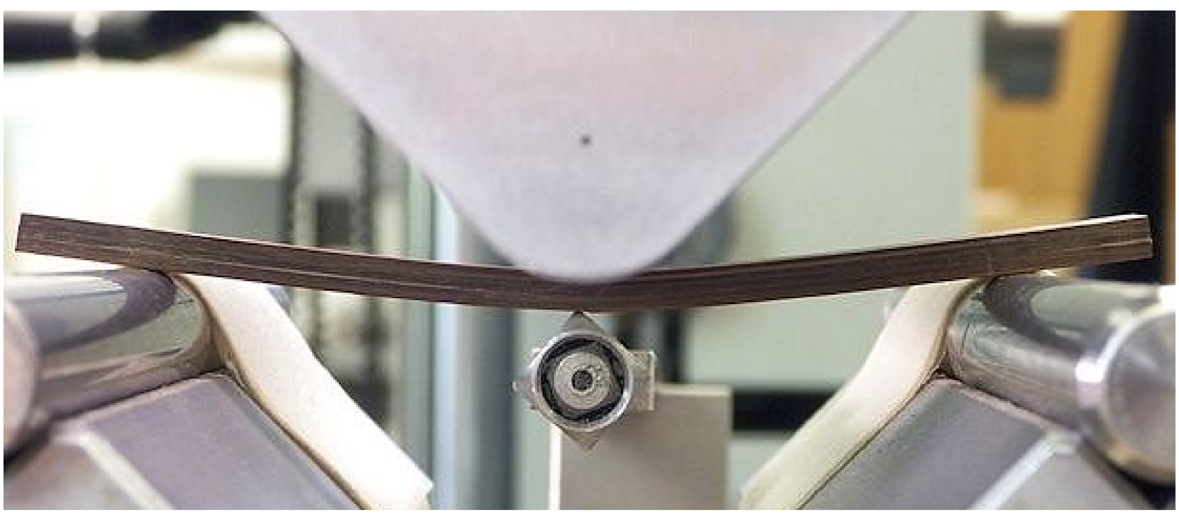

Fig. 7 Detail of three-point-bending device with sample.

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From the data, bending strength (fig. 8), elasticity (fig. 9), and density (fig. 10) are calculated. These variables are used to compare the bamboo species. We know that from Tonkin and Madake very good fly rods are made. In this respect, these two species serve as a reference to which the test rods can be compared.

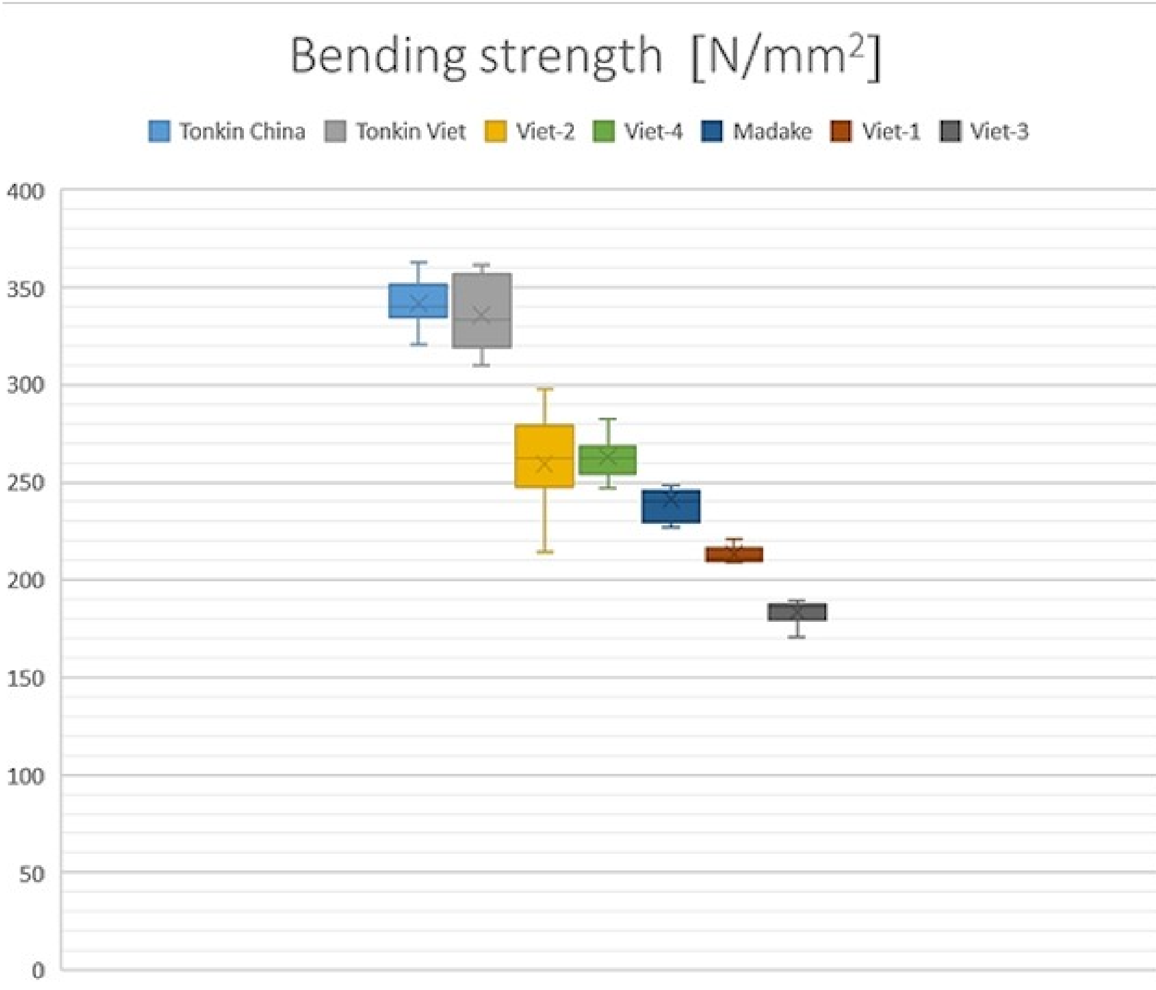

Fig. 8 Bending strength of the outer 3 mm (0.118 in) of seven bamboo species. Whisker-Boxplots showing mean, median, minimum and maximum values.

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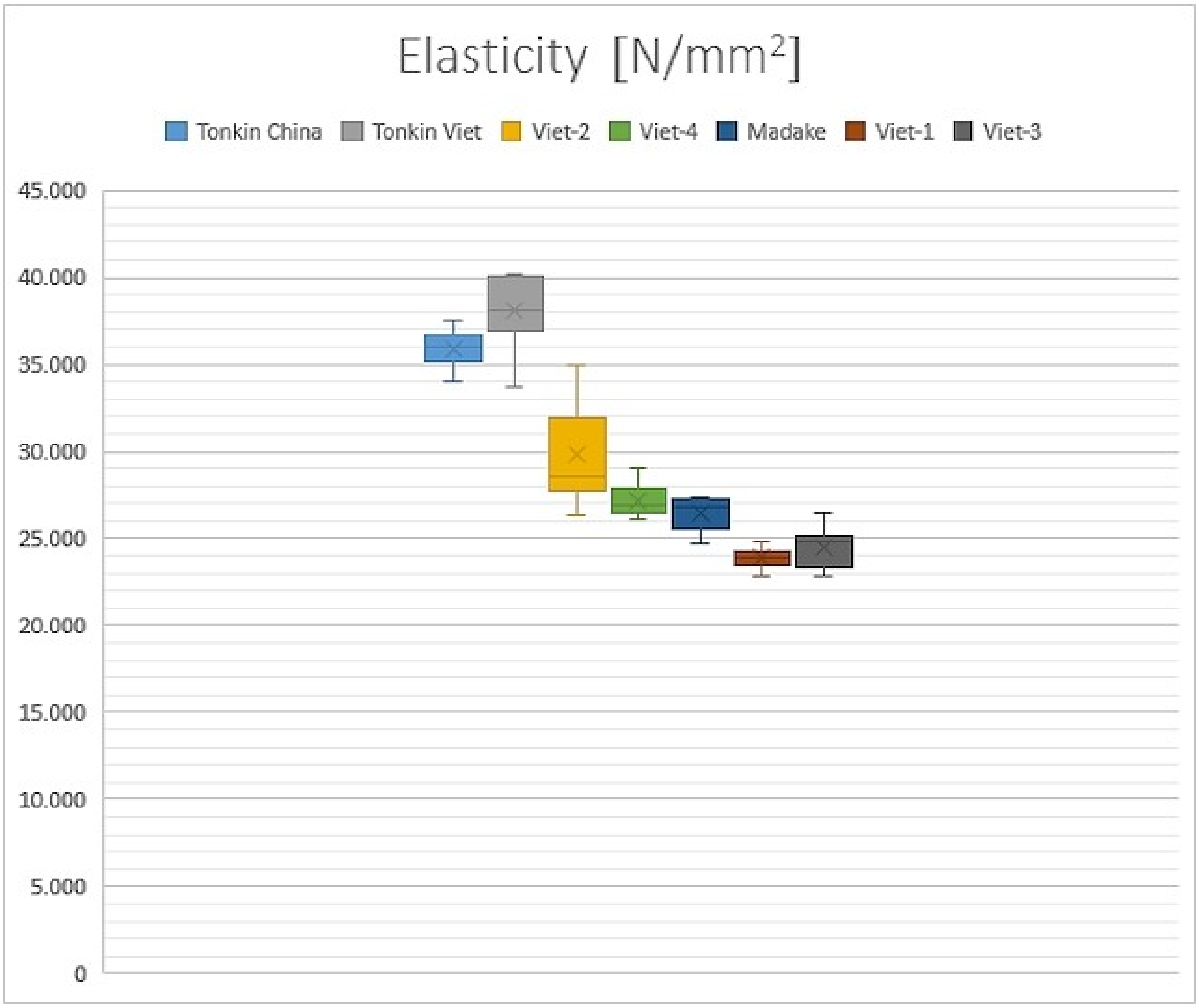

Fig. 9 Elasticity of the outer 3 mm (0.118 in) of seven bamboo species.

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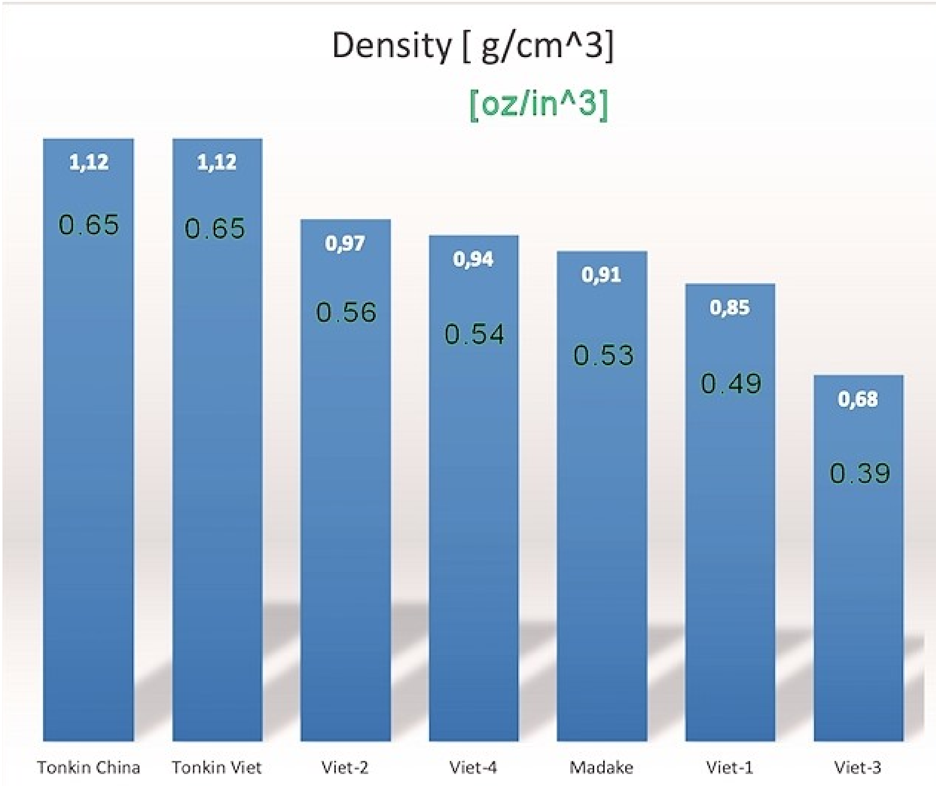

Fig. 10 Density of conditioned samples from the outer 3 mm (0.118 in) of seven bamboo species.

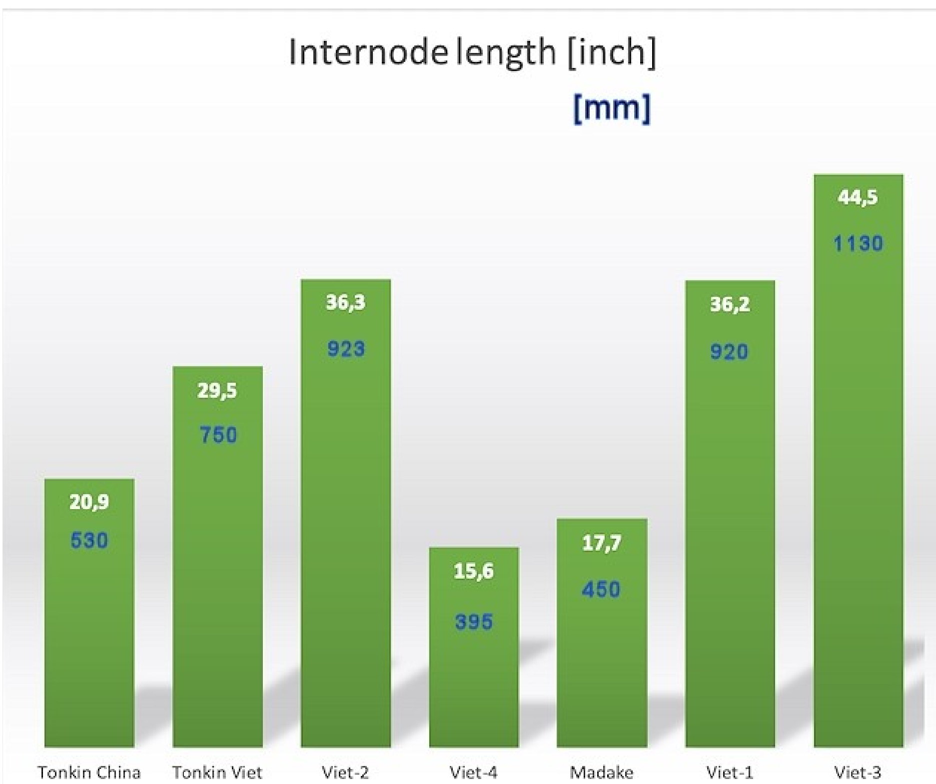

Fig. 11 Maximum internode lengths of seven bamboo species.

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Viet-1 and Viet-2 were selected for the hands-on test for two reasons. Both have very long internodes (fig. 11), which allow nodeless rod making, and the values for bending strength, elasticity and density are closest to Tonkin and Madake. Viet-3 possesses an even longer internode, but the mechanical values are relatively low. Viet-4 has good mechanical properties, but the internodes are the shortest of all tested species.

Hands-on test

Before I gave samples to other rod makers, I myself built three rods with the same taper from Tonkin, Viet-1 and Viet-2. I clamped each rod horizontally in front of a chart, attached 50 g (1.76 oz.) to the tip, marked the tip position without weight (starting point) and the position with weight. All tips arrived within a circle of 4-inch diameter. Compared to bending charts from other tapers this is a minor deviation from each other, which means from each bamboo species a rod with very similar bending properties can be build.

The photos show each rod maker with the rod he built from Vietnamese bamboo followed by his comments about the making, casting and fishing the rod (fig. 12 – 19).

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Rolf Baginski, Bremen, Germany
Viet-1, hex 7’ 3” #4, 3 pieces, spliced joints

Fig. 12 Rolf Baginski

“The bamboo is much easier to work with. It seemed "softer" to me. Because the nodes are missing, everything goes much faster, of course.

The rod felt a little slower and softer to me. Why not, but I am afraid that with rods over eight feet softness could be a problem. If this species were available, I would want to build rods with it.”

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Jörg C. Benedikt, Dresden, Germany
Viet-1, two quads 7' 3" #5, 3 pieces, bamboo ferrule

Fig. 13 Jörg C. Benedikt

“When casting the two Vietnamese blanks there was hardly any difference to Tonkin. These load a little deeper, but I did not notice any difference in the reset speed.

Conclusion: beautiful, functional blanks. Unfortunately, the material frays easily during processing. Especially with the quad blanks, I struggled to plane exact edges.”

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Masataka Akaike, Yamanashi, Japan

Viet-1 and Madake, hex 6’ 3” #4, 3 pieces, metal ferrule

Fig. 14 Masataka Akaike and bending chart of a rod made from Madake and one from Viet-1 with same taper and length with weight attached to the tip.

“If I cast, I may not be able to tell if it is Viet-1 or Madake. I did not compare those two with Tonkin cane, but I assume Viet-1 is still a little sweeter than Tonkin.

Comparing the Vietnamese bamboo to Madake, it was almost the same as Madake and I had no difficulty making the rod. I felt Viet-1 was a little easier to plane than Madake because its fibers are thicker than Madake. Since straightening the nodes is very time consuming, it is much easier to make rods without nodes. But when I make longer rods, it should be 4 or more pieces. In that case, I do not want to use metal ferrules because of its weights.

I fished the rod. It was a bit stronger than Madake. I thought the strength was between Madake and Tonkin cane. If I can get Vietnamese bamboo regularly, I am interested in using that.”

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Moreno Borriero, San Ginese, Italy

Viet-1, hex 7’ 3” #3, 3 pieces, metal ferrule

Fig. 15 Moreno Borriero

“The rough planing was very easy, which made me wonder about the integrity of the splines. Many splinters are formed. Viet-1 smells like heat-treating wet newspaper – which makes me think that there are few sugars.

Surprisingly easy to cast, it has a very sensitive tip, gives accurate casting and is easy to work with. Overall, the rod casts surprisingly well. The rod although looks good has absolutely no backbone. Needs to be tested in fishing conditions.

Interesting project but Viet-1 is not suitable for my personal use. I would like to try Viet-2.”

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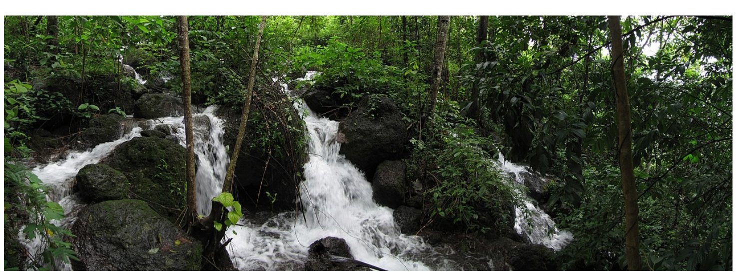
Bernard Rigal, Cazeres sur Garonne, France
Viet-1, hex 7’ 6” #4, 3 pieces, carbon ferrule

Fig. 16 Bernard Rigal

“I think Viet-1 is not good for rod building. The fibres are not regular, and the splices break easily, in some places you might think that the fibres are missing.”



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Glenn Brackett, Butte, USA
Viet-1, hex 6’ 9“ #3/4, 3 pieces, fiberglass ferrule

Fig. 17 Glenn Brackett and his blank.

“Have cut and glued up a nodeless rod from Viet-1. I am very impressed with at this stage (cleaned up but not ferruled).

The bamboo reacts to heat-treating differently than Tonkin (seems to have more sugars). Different smells when heat treating and sanding and darkens very quickly compared to Tonkin. Green color went away when heat-treated. It feels good so far when bent in the hand.”

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Ulf Löfdal, Ängelholm, Sweden
Viet-1 and Tonkin, hex 6‘ #4, 2 pieces, bamboo ferrule

Viet-2 and Tonkin, hex 6‘ 4“ #4, 2 pieces, bamboo ferrule

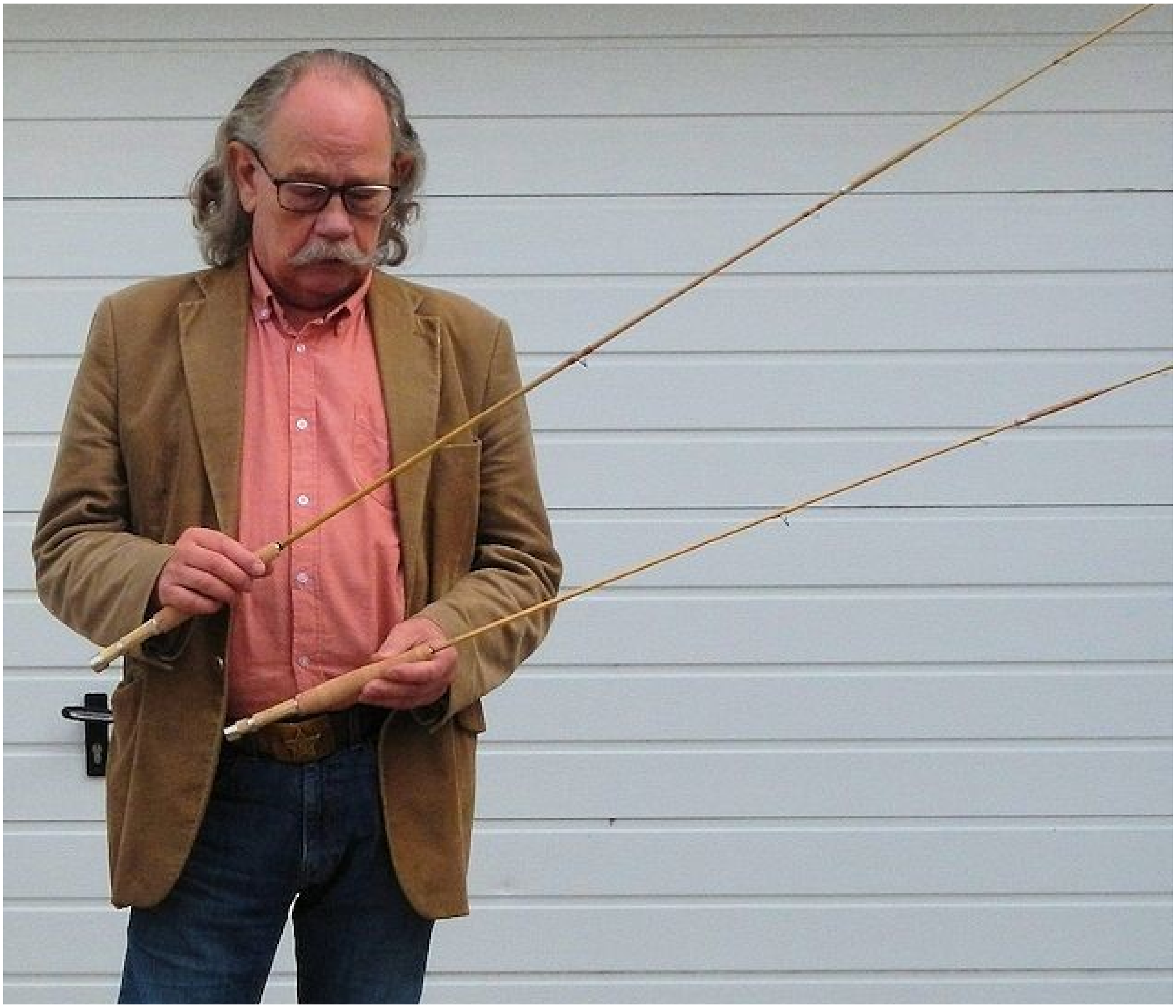

Fig. 18 Ulf Löfdal

“The most significant difference to Tonkin was that both species were softer to plane. When casting I could not feel any difference when compared to the two originals I built in Tonkin.

I might use Viet-2 in the future.”

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Philipp Sicher, Gurtnellen, Switzerland
Viet-1, Viet-2, and Tonkin, hex 7‘ 6“ #4, 3 pieces, carbon ferrule

Fig. 19 Philipp Sicher and his three test rods.

“I anticipate that I have consciously built a sensitive rod, assuming that the effects can be felt more strongly.

Processing was problem-free, from my point of view less fraying at the edges, easier to straighten.

With shorter casting distances (+ - 12 m) (39 ft.), there is hardly any difference. All three rods cast for me, but also for some very good casters, with practically no difference. Every rod casts “as if by itself” up to about 14 m (46 ft.). For longer distances, you get the feeling one has to work with the two Vietnamese rods, but further distances can be easily achieved. With Tonkin, this effect only begins at around 17 m (56 ft.); here it becomes apparent that this rod has more backbone.

Definitely interesting, if I can get Vietnamese bamboo I will build for sure.”

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Summary and Discussion

The reported experiences from the production process vary from positive to negative and are partially contradictory.

- Positive: “I am very impressed,” “because the nodes are missing, everything goes much faster,” “it was a little easier to plane than Madake.” “it is much easier to make rods without nodes,” “both species were softer to plane [than Tonkin],” “processing was problem-free, less fraying at the edges, easier to straighten.”
- Negative: “Many splinters are formed,” “The rod although looks good has absolutely no backbone,” “material frays easily during processing,” “not good for rod building. The fibres are not regular, and the splices break easily.”
- Contradictory: “seems to have more sugars [than Tonkin]” and “makes me think that there are few sugars.”

Comments regarding casting are only positive: “If I cast, I may not be able to tell if it is Viet-1 or Madake,” “Overall, the rod casts surprisingly well,” “I could not feel any difference [Viet-1 and 2] when compared to the two originals I built in Tonkin,” “All three rods [Tonkin, Viet-1 and 2] cast for me, but also some very good casters, with practically no difference.”

These are the comments about fishing with the Viet-1 test rods: “Needs to be tested in fishing conditions.” “I fished the rod. It was a bit stronger than Madake.” I myself caught seatrout nicely with Viet-1 and 2.

Regarding the question if one would like to use Vietnamese bamboo in the future, two were negative about Viet-1, four were positive about Viet-1 or Viet-2:

- “If this species were available, I would want to build rods with it.”
- “If I can get Vietnamese bamboo regularly, I am interested in using that.”
- “I would like to try Viet-2.”
- “I might use Viet-2 in the future.”
- “Definitely interesting, if I can get Vietnamese bamboo I will build for sure.”

Unsurprisingly, every bamboo species is different, and one needs to learn how to handle it. It may smell different from Tonkin while tempered and edges may fray more easily. However, results of the mechanical test revealed relatively high values for all seven bamboo species for bending strength and elasticity. These properties characterize the suitability of the bamboo species for rod making. The bending strength of the bamboo species differs from each other. These differences did not crop up in the test rods as one might expect. How can this be explained?

The range of the bending strength of Tonkin, Viet-1 and 2 extends from 200 to 360 N/mm^2, which is very high compared to hardwood, e.g. oak, which has a value of around 100 N/mm^2. One must bear in mind these mechanical properties can only be determined when the objects are fixed. Values for these variables give only a first idea how these bamboo species are suited for rod making compared to others. Even though Tonkin is the ‘strongest’ of the seven species investigated, i.e. it possesses the highest bending strength-to-weight ratio, this is not the answer to the quest for the best possible bamboo rod.

Casting a rod is a dynamic process and other mechanical laws apply than in the resting state. When

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we move from the static to the dynamic phase bending strength and elasticity become secondary variables. Effects of the taper – how mass is distributed in the rod - and the acceleration are main factors for the rod's behaviour while casting.

A rod maker knows a minute modification of the rod's diameter changes the weight class of the rod. This dimensional change has a much higher impact than the difference of the mechanical properties between bamboo species. In other words, by changing the taper a stiffer rod can be built from Viet-1 or 2 than from Tonkin. An example is shown in the bending chart, where two rods are loaded at the tip with 50 (1.76) and 100 g (3.53 oz.) (fig. 20). The rod made from Tonkin bends more than the one made from Viet-2. The last one is stiffer. The rods should have been identical (same taper and length), but due to the author's incapacity the Tonkin rod turned out to be slightly thinner.

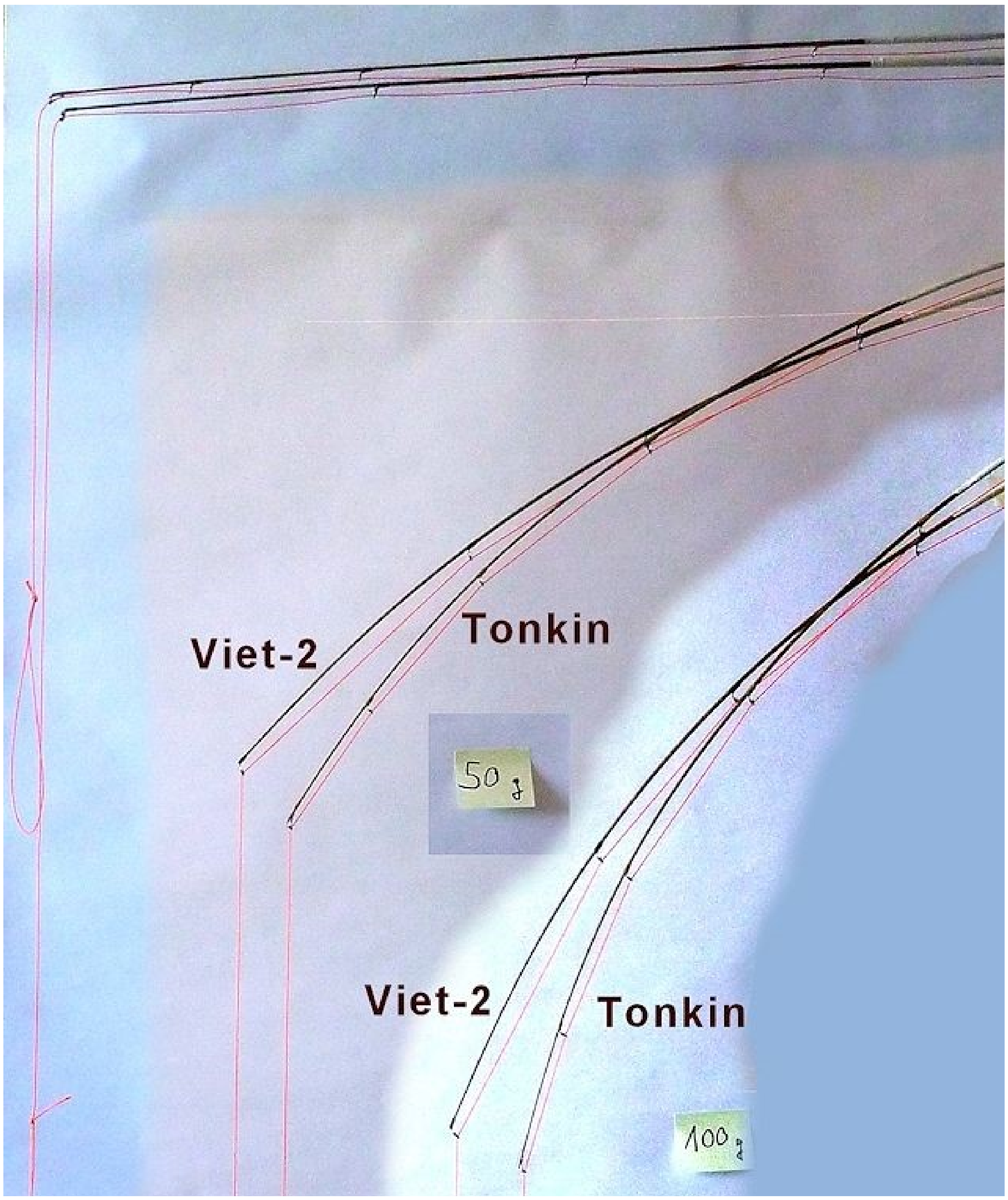

Fig. 20 Bending chart of a rod made from Tonkin and one from Viet-2 with same taper and length without weight and with 1.76, respectively 3.53 oz. attached to the tip.

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Remember, looking at the bending chart is a static observation. Casting these rods, – a dynamic process – is a completely different story. Moreover, which rod you might like best is something else again. The dynamic behaviour of a tapered rod is complex and very difficult to calculate. However, one can cast a rod instead and examine its behaviour. This is a subjective method, but a practical one, which is decisive for the angler. He is interested how the rod is casting.

Node treatment requires a considerable amount of time. Vietnamese bamboo offers the possibility to build three- or four-piece rods nodeless. Therefore, internode length is certainly another quality criterion in addition to fibre density.

Bernard Rigal gave me his rod made from Viet-1 calling it "la canne carton" (the cardboard rod). So far it did not break. I even caught a seatrout with it (fig. 21).

Fig. 21 "La canne carton" was tested under harsh conditions in the Northwest Atlantic on the Faroe Islands.

Some makers will remain sceptical about the long-term properties. The answer will come in the long run, but I expect the Vietnamese species to behave as all bamboo species, which have been used for

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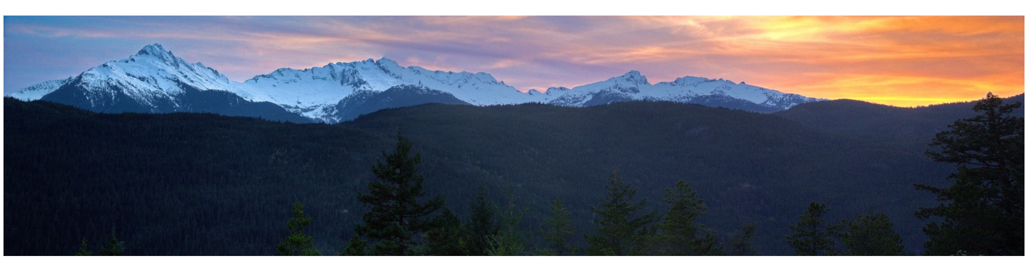

rods. The cross section shows that the basic structure of the culms is the same as in all other bamboo species (fig. 22). The density of the fibre bundles decreases from the outside to the inside.

Due to Corona, Viet-2 culms are not available at present. If you are interested in this species, please send your contact details to info@springforelle.de and I will inform you, when the situation has improved.

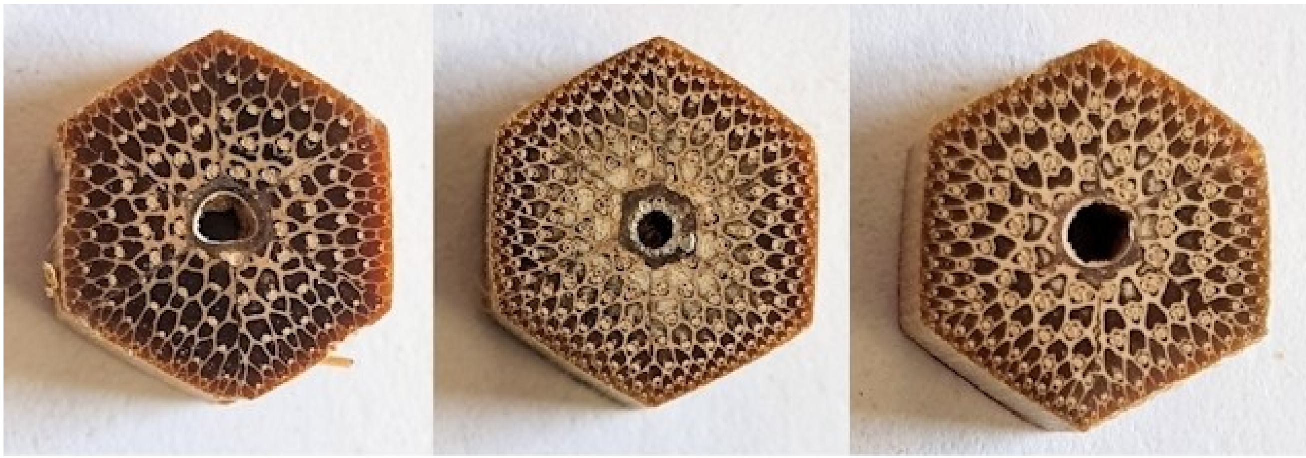

Fig. 22 Cross sections from blanks of Philipp Sicher.

Conclusion

It is worthwhile trying other bamboo species than Tonkin for rod making. Especially the node treatment of the traditionally used Tonkin requires a lot of time and produces weak spots in the rod. Using bamboo species with internodes of 28 to 35 inches allows making rods without nodes. However, the mechanical properties of other bamboo species should be evaluated.

Even though the mechanical properties of Tonkin, Viet-1 and 2 differ, the rods do not differ much. Values of bending strength and elasticity from samples of the outer 3 mm (0.118 in) of the culm are high for all tested bamboo species. The differences when casting the test rods of same taper from Viet-1 and Viet-2 in comparison with one from Tonkin are very subtle. The bamboo species is not the key factor for the rod's casting properties, but the dimensional property, the taper of the rod. The rod maker is the one who decides if a rod possesses less or more backbone.

Good rods, i.e. ones which cast and fish well, can be made from Vietnamese bamboo. The test results allow concluding the mechanical properties of Viet-2 are sufficient to make rods like the ones from Tonkin. Moreover, the very long internodes of this species reduce the working time considerably, eliminate node staggering and thereby weak spots. The possibility to build without nodes offers a great advantage for three- or four-piece rods.

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