Title: PUPUNHA PLYWOOD AND PROCESS FOR PRODUCTION OF THE SAME

Abstract: The invention refers to the plywood made out of mature trunks of pupunha (Bactris gasipaes Kunth) from the family of the palm-trees. The plywood is made of at least one plate of laths of pupunha pressed horizontally with or without heat. This plate can be compressed to other plates through the process of vertical pressing with or without heat. The sides mutually touched of the laths and the plates of pupunha are covered with adhesive. The main objective is to provide the usage of a sub-product of the food industry (mature trunk extracted from the process of selective handling) justifying the production of a good-quality plywood, economically available, with high index of exploration from the raw material, dimensional stability, flexibility and mechanical resistance.
PUPUNHA PLYWOOD AND PROCESS FOR PRODUCTION THE SAME

This invention refers to the plywood made from the mature trunks of Pupunha (Peach-Palm) (*Bactris gasipeas kunth*) from the family of the palm-trees, usually known as Pupunheira, Pupunha-Marajá, Pirajá- Pupunha.

This palm-tree is a native plant of the Amazon, it has a extended cylindrical trunk that reaches an average height of 20 meters (approximately 60 feet), its diameter varies from 15 to 30cm and the distances between knots varies from 1 to 30 cm, besides this, it has great amounts of thorns all over the trunk. The inerme type, plant with out thorns, was imported from the Yurimaguas region, in Peru, and nowadays is the most used in researches and commercial explorations. The color of the trunk is dark with yellow lodes well differentiated, presenting accentuated brightness, distinguished taste and smell, fine texture, the peripheral section of the trunk is very heavy and it has a great mechanical resistance. The Pupunheira (Peach-palm) is cultivated mostly for the palm-hearts production and in a smaller scale for the production of fruits, motivated for the great perspectives of the palm-hearts market.

Nowadays the palm-heart is extracted mainly from the Açai palm tree (*Euterpe oleracea*) and from the Juçara palm tree (*Euterpe edulis*), both originary from the North region of Brazil, apart from other palm trees native to the Rain Forest. This extraction is being conducted in a predatory way, which contributes to the decimation of several native species from the Amazon estuary. In this context, the culture of the Pupunheira appears as an alternative for the predatory exploitation of the native reserves of palm trees.
The cultivation of the Peach-palm for the production of fruits and seeds, after 8 to 10 years, results in great amounts of wooden material from the trunk, due to the great heights of the mature species and the reduction in the fruits production, which leads to an increase in the production costs, the producer is obligated to manage the thicket to make room for the palm trees in fruition. In the case of the palm-hearts production, with the intention of becoming self-sustainable in the production of seeds, the Pupunha producers designate certain areas for the development of palm tree matrices. Only palm trees older than 7 years are able to produce seeds, so the producer must select the best individuals to preserve them in a way that they become matrices. After a certain period, these palm trees reach the height of 20 meters resulting in undesirable shadows over the plantation. This area must be aired periodically, implicating in a selective handling of the matrices, resulting in, as in the case of the fruit production, great amounts of wooden material from the trunk with characteristics similar to the wood proceeding from noble arboreous species.

Therefore, the objective of the present invention is to allow the use of this by-product of the nourishing industry (mature trunks extracted in the process of selective handling) in the production of a noble ply-wood, with high aggregated value, excellent quality for the industry and for the environment as well.

This objective is reached according to general terms: The Pupunha ply-wood, pupunha or any plant of the palm tree family, is composed of at least one plate of laths of Pupunha compressed horizontally. The plate can also be compressed to other plates through a process of
vertical compressing making use of an adhesive to hold the plates together. The laths are processed by cutting the trunk in several parts, sawing the parts in its longitudinal direction obtaining two half trunks, separating these half trunks in several pieces also in the longitudinal direction, and preparing them afterwards. The laths are arranged side by side, making use of a compressing machine and of an adhesive, the laths are horizontally compressed (with or without heat).

The other objectives and merits of this invention will be described in details according to the drawings:

Fig.1 - view representing the trunk in pieces
Fig.2 - view representing two half trunks as a result of the sawing of one of the pieces in the fig.1
Fig.3 - view representing the process of longitudinal sawing of one of the half trunks shown in the fig.2
Fig.4 - view representing the preparation of the pieces obtained previously, resulting in laths with uniform thickness and width.
Fig.5 - view representing the horizontal compress of the Pupunha laths.
Fig.6 - view representing the plate
Fig.7 - view representing the plates being compressed to one another

The detailed process of obtaining of the Pupunha ply wood, according to the figures listed previously is described as follows:

a) Selection, analyzing and cutting of the Pupunha or any plant of the palm tree family trunks over 8 years old

b) Sawing the trunk in pieces, according to the need in a way that guarantees the quality of the laths
will be the same, this pieces are classified and distributed in groups according to its place of origin (fig.1)

   c) The separated pieces are sawed in sequence in the longitudinal direction, in a way that results in two identical half trunks for each piece (fig.2)

   d) It is possible to obtain several pieces from each half trunk, with the desirable thickness, through longitudinal sawing (fig.3), avoiding to exceed 8 cm, because, otherwise, it will result in material waste.

   e) Removal of the inner and fibrous part of the trunk, in a way that the laths are composed only by the outer section of the trunk.

   f) Dehydration (naturally or in a stove) of the pieces obtained in the last process

   g) Preparation of the dehydrated pieces having in view the production of the laths (fig.4)

   h) Placement of the laths side by side with the adhesive, and its horizontal compression (using heat or not), resulting in a plate (fig.5)

   i) Dehydration (naturally or in a stove) of the plate resulted from the last process

   j) Finishing of the plate, in a way that the imperfections resulted from the compression can be removed

   k) If the intention is to produce only one plate (fig.7), it is necessary to do its final finishing. If the plate is going to be compressed with another one, this finishing is not necessary at this moment.

   l) Compressing plates to one another (fig.): first its necessary to spread the adhesive in to the areas that are going to be compressed, afterwards its necessary to put the plates in position, choosing the desirable fiber
direction and than the compression can be done (with or with out heat)

m) The glued plates, that results in a block, are removed from the compressing machine

n) After the time necessary for the block to be stable, it can be finished.

o) Final finishing of the block.

It is known, from the state of the technique concerning this technological sector that, up to the present moment the ply wood is made out of the wood from arborous species. The Bamboo is also used as in the Chinese patents No. CN 100368A and CN 2161443Y or in the English one No. GB 2292336A. There is also an example in Brazil where the coconut fibers are used in the production of ply wood (patent No. PI 0302811-9). It is also known that the trunk of Pupunha is used in the production of furniture, described in the patent No. PI 100909-5A, although it is not used as a ply wood.

Effectively, the ply wood obtained with this invention represents something new and with a place of highlight when compared to the characteristics presented above concerning the state of the technique. Besides, it has the merit of making use of a by product from the nourishing industry, having as objective the production of a new material economically viable, with a low cost of production and a low level of waste of the raw material. Added to that, it presents a high mechanical resistance, dimensional stability, uniform thickness, good appearance and flexibility. This invention also contributes to environment, since it makes use of the end of a life cycle (the disposal of the trunks) to begin a new one (the production of the ply wood made out of Pupunha), which lead to a sustainable use of our natural resources, encouraging
the plantation of a reforestation specie (*Bactris gasipaes Kunth*) and generating a business alternative to compete with the wood industry and the predatory exploitation of native trees.
CLAIMS

1. Pupunha plywood, characterized by comprising a plate constituted by laths from the trunk of pupunha with uniform thickness and width, horizontally compressed with or without heat with the use of an adhesive, the laths being processed by cutting the trunks in several parts; sawing the parts in a longitudinal direction, thus obtaining two equal bands for each part; separating this half bands in several pieces in longitudinal direction as well, removing the inside tissue of trunk and preparing the resulting parts.

2. The pupunha plywood, characterized by comprising at least two plates mentioned in Claim 1, vertically pressed through the process of compressing with or without heat, the surfaces of adjacent plates being covered with adhesive.

3. Process for production of the pupunha plywood of claim 1, characterized by comprising the following steps: selection, analyzing and cutting of pupunha trunks with age over 8 years old; sawing the trunk in pieces according to the need; classifying and distributing the pieces in groups according to its place of origin in the trunk; separating the pieces thorough sawing in longitudinal direction, thus obtaining two identical half trunks for each piece; removing the pieces with desired thickness thorough longitudinal cut of the bands; removing the inner tissue of the trunk, so as to obtain all the peripheral portion; natural or in a stove dehydration of the pieces obtained in the last step; preparation of the already dehydrated pieces in order to product the laths; preparation of the laths side by side by using adhesive to horizontal hot or cold compression, so as to obtain the plate; natural or stove dehydration of the plate obtained in the last step;
finishing the plate so as to remove surface imperfections; final finishing of the plate.

4. Process for production of the pupunha plywood of Claim 2, characterized by comprising the following steps:

selection, analyzing and cutting of the trunks of pupunha with age over 8 years old; sawing the trunk in pieces according to the need; classifying and distributing the pieces in groups according to its place of origin in the trunk; splitting of the pieces by sawing in longitudinal
direction, thus obtaining two identical half trunks for each piece; removing the pieces with desired thickness through longitudinal sawing in the bands; removing the inner tissue of the trunk, so as to obtain all the peripheral portion; natural or stove dehydration of the pieces obtained in the last step; preparation of the laths side by side with adhesive to horizontal hot or cold compression so as to form the plates; natural or stove dehydration of the plate obtained in the last step; finishing of the plate so as to remove surface imperfections; compressing plates against one another by covering that plate surface with adhesive placing them in a relative desired direction of the fiber and then compressing by hot or cold compression; removing the block; stabilizing the block; final finishing of the block.