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Testando delimitação de espécies em monografias – um estudo de caso em *Aniba* Aubl. (Lauraceae)

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Manaus, Amazonas

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Orientador: Dr. Alberto Vicentini

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Nada mais havendo, foi lavrado a presente ata, que, após lida e aprovada, foi assinada pelos membros da Comissão Examinadora.

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Sinopse:

Neste trabalho foi proposto um teste para avaliar a delimitação de espécies em monografias, como exemplo empírico da aplicação deste teste, usamos um complexo de espécies do gênero *Aniba* Aubl. (Lauraceae). Também é discutida a variação morfológica e espectral do grupo.

Palavras-chave: *Aniba rosaeodora*; taxonomia; complexo de espécies; modelos de distribuição normal; predições de monografias

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"They are just different! (Until more collections show other way...)"

Conceito de espécie de Ron Liesner

Resumo

Neste artigo nós questionamos se delimitações de espécies em monografias podem ser testadas de forma explícita e independente do conceito de espécie adotado. Testando três predições derivadas da monografia do gênero neotropical *Aniba* Aubl., nós detectamos falhas na circunscrição de suas espécies que causam problemas não só na taxonomia do grupo, mas também na conservação do pau-rosa, uma espécie de alto valor econômico e ameaçada de extinção. O teste proposto é construtivo porque derivando e testando uma variedade de predições é possível distinguir aspectos de uma monografia que são empiricamente suportados daqueles que não são, permitindo a elaboração de uma nova delimitação das espécies usando aspectos válidos da monografia, ao invés de aceitá-la ou rejeitá-la completamente.

Abstract

In this paper we ask whether species delimitations in monographs can be explicitly tested independently of the species concept involved. By testing three predictions derived from the monograph of the neotropical genus *Aniba* Aubl., we detected problems in circumscription of its species that causes problems not only for taxonomy, but also for conservation of rosewood, an endangered species with high economic importance. The proposed test is constructive because deriving and testing a variety of predictions, it is possible to distinguish aspects of a monograph that are not empirically supported from those that are, allowing build new species delimitation using worthy elements of monographs, rather than fully accepting or rejecting it.

SUMÁRIO

INTRODUÇÃO GERAL

O presente artigo apresenta uma discussão sobre a prática taxonômica, especificamente sobre aspectos da construção de uma monografia. Nele, abordamos questões sobre como espécies são delimitadas, quais caracteres são usados para o seu reconhecimento e como essa informação é transmitida na forma de descrições que sumarizam a variação morfológica das espécies em questão. Especificamente, é proposta uma metodologia para testar a delimitação de espécies em monografias, tendo como estudo de caso uma monografia do gênero *Aniba* Aubl. (Lauraceae). Somado a isso, é apresentado um apêndice onde exploramos a variação morfológica e de dados de espectroscopia no infravermelho próximo de folhas, ilustrando dificuldade encontrada na tentativa de postular hipóteses de espécies para este grupo.

Lauraceae é uma família de grande representatividade na Amazônia. Possui aproximadamente 50 gêneros e 2500 espécies, é uma família pantropical com centro de diversidade na região neotropical, Australásia e Madagascar, e um importante componente das florestas de terra firme. É composta principalmente por árvores, exceto pelo gênero *Cassytha* que é uma erva parasita. Além da importância ecológica, a família Lauraceae é muito explorada comercialmente por possuir óleos essenciais, madeira de boa qualidade e na gastronomia, como as folhas de louro (*Laurus nobilis* L.) e o abacate (*Persea americana* Mill.). Historicamente é reconhecida como uma das famílias mais difíceis de trabalhar do ponto de vista taxonômico por várias razões: a dependência de caracteres de flores e frutos, pois vegetativamente espécies próximas são morfologicamente indistinguíveis, associada à dificuldade de coletar material fértil, pois as flores são inconspícuas; ausência de boas chaves taxonômicas, às vezes baseadas em apenas flores masculinas, havendo também grande sobreposição de caracteres entre as espécies, mesmo em flores e frutos; e a falta de conhecimento das florestas tropicais, regiões de grande diversidade da família. Além disso, a presença de flores não garante a correta identificação de gêneros, pois os caracteres utilizados nas classificações intrafamiliar são homoplásicos na família em relação aos gêneros existentes, às vezes variando em uma mesma espécie. Alguns gêneros como *Ocotea* e *Endlicheria* não são grupos monofiléticos, outros como *Aniba* são aparentemente monofiléticos, mas foram pouco amostrados em filogenias moleculares. A combinação de taxonomia complexa em Lauraceae, a escassez de coletas na

Amazônia, alta diversidade e diversificação recente, faz com que existam diversos problemas de delimitação de espécies em Lauraceae, como é o caso em *Aniba*.

A última revisão do gênero *Aniba* foi realizada por Kubitzki (1982). Nela foram reconhecidas 41 espécies divididas em dois grupos: grupo *affinis*, com 15 espécies, e grupo *guianensis*, com 26 espécies. O principal critério utilizado para a criação destes grupos foi a estrutura dos estames, sendo que no grupo *affinis* os estames do primeiro e segundo verticilo possuem um conectivo pequeno e protuberante, com anteras latrorso-introrsas com valvas abrindo-se obliquamente para cima, estames do terceiro verticilo com valvas inseridas na parte superior externa da antera e de deiscência incompleta. No grupo *guianensis*, a largura do filete é igual ou maior que a da antera e o conectivo não é tão protuberante, as anteras dos estames do primeiro e segundo verticilos são ventrais e a abertura das valvas é completa e para cima nos três verticilos. Os dois grupos também foram diferenciados quanto à produção de compostos secundários, enquanto o grupo *affinis* se caracteriza pela produção de neolignanas, o grupo *guianensis* produz pironas. Desde a revisão de Kubitzki três novas espécies de *Aniba* foram descritas: *A. heterotepala* van der Werff, *A. pilosa* van der Werff, *A. vulcanicola* van der Werff, sendo que as duas primeiras assemelham-se às espécies do grupo *guianensis* e *A. vulcanicola* assemelha-se às espécies do grupo *affinis*. Portanto, a taxonomia de *Aniba* sugere um grupo com aproximadamente 44 espécies, com centro de diversidade na Amazônia Central.

O grupo *guianensis* possui um conjunto de espécies de fácil reconhecimento por apresentar papilas (Figura 02), isto é, projeções epidérmicas digitiformes na superfície abaxial das folhas cobertas por uma camada de cera. Essas espécies formam o subgrupo *panurensis*, com exceção de *Aniba burchellii* Kosterm., que pertence ao grupo *affinis* devido à estrutura do estame do terceiro verticilo, cuja deiscência é incompleta, enquanto nas espécies do subgrupo *panurensis* a deiscência é completa. A delimitação das espécies deste subgrupo não está clara, principalmente entre *Aniba panurensis* (Meisn.) Mez, *Aniba firmula* (Nees & Mart.) Mez, *Aniba parviflora* (Meisn.) Mez, *Aniba rosaeodora* Ducke, *Aniba cylindriflora* Kosterm., *Aniba heringeri* Vattimo-Gil, *Aniba coto* (Rusby) Kosterm. e *Aniba muca* (Ruiz & Pav.) Mez. A delimitação destas espécies baseando-se em caracteres vegetativos é quase impossível, e mesmo na presença de flores pode ser difícil, em alguns casos elas podem ser diferenciadas apenas pelo fruto ou distribuição geográfica. Para este conjunto de espécies daremos o nome complexo *Aniba panurensis*.

Dentre essas espécies, *Aniba rosaeodora* merece destaque. Esta espécie, conhecida popularmente como pau-rosa, é explorada comercialmente pelo seu óleo essencial e está incluída na lista de espécies ameaçadas de extinção da IUCN. Mateiros da região de Maués reconhecem formas diferentes de pau-rosa relacionadas com quantidades diferentes de produção de óleo essencial, que podem representar variação não descrita para o grupo, ou simplesmente refletir a sobreposição morfológica, principalmente vegetativa, entre as espécies do complexo *Aniba* p*anurensis* de forma geral. Um exemplo disso é o fato de já ter sido encontrada em plantações de pau-rosa espécimes de *A. panurensis* e *A. parviflora*, provavelmente plantadas por um erro de identificação. Isto evidencia que os limites e a natureza biológica das entidades descritas como *Aniba rosaeodora*, *Aniba parviflora* e *Aniba panurensis* não estão muito claros e podem incluir ainda outras espécies.

OBJETIVOS

- Propor um método para testar a delimitação de espécies em monografias que seja geral o suficiente para ser aplicável em qualquer monografia,
- Avaliar a delimitação de espécies feita na última monografia do gênero *Aniba* e os limites entre as espécies do complexo *Aniba panurensis* através da aplicação do teste proposto.

Capítulo 1

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Testing species delimitation in monographs – a study case in *Aniba* Aubl. (Lauraceae)

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Abstract – In this paper we ask whether species delimitations in monographs can be explicitly tested independently of the species concept involved. By testing three predictions derived from the monograph of the neotropical genus *Aniba* Aubl., we detected problems in circumscription of its species that causes problems not only for taxonomy, but also for conservation of rosewood, an endangered species with high economic importance. The proposed test is constructive because deriving and testing a variety of predictions, it is possible to distinguish aspects of a monograph that are not empirically supported from those that are, allowing build new species delimitation using worthy elements of monographs, rather than fully accepting or rejecting it.

Keywords: *Aniba rosaeodora*; taxonomy; species complex; Gaussian mixture models; monographs predictions

Testando delimitação de espécies em monografias – um estudo de caso em *Aniba* Aubl. (Lauraceae)

Resumo – Neste artigo nós questionamos se delimitações de espécies em monografias podem ser testadas de forma explícita e independente do conceito de espécie adotado. Testando três predições derivadas da monografia do gênero neotropical *Aniba* Aubl., nós detectamos falhas na circunscrição de suas espécies que causam problemas não só na taxonomia do grupo, mas também na conservação do pau-rosa, uma espécie de alto valor econômico e ameaçada de extinção. O teste proposto é construtivo porque derivando e testando uma variedade de predições é possível distinguir aspectos de uma monografia que são empiricamente suportados daqueles que não são, permitindo a elaboração de uma nova delimitação das espécies usando aspectos válidos da monografia, ao invés de aceitá-la ou rejeitá-la completamente.

Palabras-chave: *Aniba rosaeodora*; taxonomia; complexo de espécies; modelos de distribuição normal; predições de monografias

INTRODUCTION

Monographs represent a summary of all knowledge about the diversity of a taxonomic group and how to identify its entities, providing crucial information for all biological science. Studies in biology relies on the correct identification of taxa, so errors in this initial step can change the our knowledge about nature, resulting in problems for environmental manage (Stuessy 1975; Bortolus 2008). Therefore, the relevance of a monograph is highly dependent on the quality of the descriptions of the keys to species and of the delimitation of the taxa studied.

Nevertheless, taxonomists seldom discuss the species concepts and the methodology by which they delimit species (McDade 1995). This practice makes the taxonomic work subjective, resulting in a very different hypothesis about species number in a group (Godfray 2002), and making difficult to validate the hypotheses of species proposed. Despite their importance for basic and applied science, there seem to be no principle approach to test the species delimitations proposed by a monograph. The only thing a taxonomist revising a group can do is to propose new hypotheses without testing those from previous monographs (Henderson 2005). Consequently it is difficult to determine whether the new hypothesis is actually better.

A test of species delimitations would allow to determine the extent to which the descriptions in a monograph match the organisms examined (Kellogg 1994). Even though there is no principal way to test the species delimitations of a monograph, some kind of test is presumably conducted on a regular basis when the identification key provided in the monograph is used. Although this allows one to detect problems in the monograph, it does not make clear how exactly it is wrong neither whether information in the monograph is useful.

An example of a problematic monograph can be found in the Flora Neotropica of the genus *Aniba* Aubl. (Kubitzki & Renner 1982). In this monograph 41 species were recognized and the genus was divided in two major groups based on the shape of the stamens: the *affinis*-group with 15 species, and the *guianensis*-group with 26 species. Another important character for subdivision of the genus is the presence of digitiform projections of the epidermis (papillae) on the lower surface of leaves. Papilose leaves are present in 12 species of the *guianensis* group characterizing the *panurensis*-subgroup. *Aniba burchelli* Kosterm. is the only species with papilose leaves that was not included by Kubitzki in the *panurensis*-subgroup, but in the *affinis*-group because of the shape of the stamens. The limits between the species placed in the *panurensis*-subgroup are not well-defined. Both sterile and flowering or fruit specimens are almost impossible to be keyed to species with certainty. In these cases, specimen identification can only be conducted with fruits characters and/or geographical distribution. This is the case for *Aniba panurensis* (Meisn.) Mez, *Aniba firmula* (Nees & Mart.) Mez, *Aniba parviflora* (Meisn.) Mez, *Aniba rosaeodora* Ducke, *Aniba cylindriflora* Kosterm., *Aniba heringeri* Vattimo-Gil, *Aniba coto* (Rusby) Kosterm., *Aniba muca* (Ruiz & Pav.) Mez and *Aniba burchellii*. These species are considered here as the *Aniba panurensis* species complex.

Aniba rosaeodora, also known as the rosewood ("pau-rosa"), is a species with high economic importance due to its essential oil, used in the cosmetic industry. Due to the exploitation of the essential oil this species was ranked as an endangered species by the IUCN (Varty 1998). However, the circumscription of this species is not clear, resulting in difficulties in its recognition, as reflected by the fact that two other species, *A. parviflora* and *A. panurensis*, have been found in rosewood plantations for oil extraction (Kubitzki & Renner 1982; May & Barata 2004), possibly due to misidentification. According to Kubitzki's monograph, *A. panurensis* differs from *A. rosaeodora* by having a flat or slightly revolute leaf margin and bigger flowers, as oppose to revolute in *A. rosaeodora*. Both are weak characters, the difference between slightly revolute and revolute leaf margin being highly subjective. *Aniba parviflora* should be recognized by unequal tepals, the outer ones being smaller than the inner ones, but there are no clear differences in vegetative characters between these species concepts, which are easily interchangeably misidentified. Therefore, a better understanding of the delimitation of the species in this group would help make sound conservation plans and support silviculture practices for the production of rosewood essential oil.

In this paper we ask whether species delimitations in monographs can be explicitly tested. We developed an approach that does not involve *a priori* assignment of specimens to species neither makes necessary previous knowledge of the species concept adopted in the monograph, two common difficulties faced when testing hypothesis of species (Sites & Crandall 1997; Edwards & Knowles 2014). Rather, the test involves deriving from the monograph of interest general kinds of predictions about the characters used to delimit species and about particular outcomes of applying the procedures to assign specimens to species specified by the monograph. A demonstration of application of this test is provided using the *Aniba panurensis* species complex.

MATERIAL AND METHODS

First, three kinds of predictions that can be derived from any monograph are described, and their implementation to the study case are explained. These implementations involves delimiting groups of specimens based on the diagnostic characters of the species according to the monograph (Table 1, figure 1), and comparing these groups (hereafter *morphological-groups*) to the species hypothesized in the monograph (hereafter *monograph-species*).

Prediction 1 - The qualitative characters used to delimit *monograph-species* should be invariant within individuals.

Independently of the species concept employed, *monograph-species* are described based on morphology and qualitative characters. This is usually done because of practical reasons: the monographer uses characters that are most easily perceived by any person using it. Qualitative characters are very useful in this sense if, and only if, character states are unambiguous and invariant within an individual, i.e. an individual do not possesses more than one character state (Wiens & Servedio 2000). Therefore, our hypothesis is that a character state keying to species should be exclusive to a *monograph-species*. Hence, characters keying to species should be invariant within individuals.

According to the monograph the most informative qualitative characters separating species are in the ovary, floral tube and the stamens of whorls I and II (Table 1, figure 1). These characters should differentiate *Aniba burchellii* and *A. cylindriflora* from all others species. We queried the data matrix for specimens that had more than one character state for any of these characters. Finding such specimens would imply in failure of the monograph to the test.

Prediction 2 - The number of *morphological-groups* defined by any character or combination of characters should be the same as the number of *monograph-species* or group of *monograph-species* that are defined by these characters.

Once detected, according to the monograph, which character or combination of characters were used by the monographer to delimit one or more *monograph-species*, one can test whether specimens form groups based on these characters. The hypothesis here is if the monograph propose that a certain number of species can be delimited by a certain number of characters, then it is expected that delimiting specimens according to these characters one should find the same number of *morphological-groups* as the number of *monograph-species*.

In this case, all characters that can delimit the *monograph-species* were used to define *morphological-groups* (Table 1, figure 1), which were defined as follows.

First, the quantitative characters were selected and a model-based cluster analysis using Gaussian mixture models was performed with a varying number of clusters, and the selection of the best model was made based on a Bayesian Information Criterion (BIC) (Fraley & Raftery 2002). Then, the groups detected were plotted in a dimension reduced subspace to visualize clustering structure (Scrucca 2010). This analysis was conducted using the R package mclust (Fraley et al. 2012), and because it assumes that the data have a normal distribution, variables were log-transformed before the analysis.

Secondly, the qualitative characters were selected to be used in two classifications: a) one based on combinations of characters states of the ovary and floral tube that should separate *Aniba cylindriflora* from the rest; b) another based on combinations of characters states of the outer stamens that should separate *A. burchellii* from the rest (Table 1, figure 1). All others species were delimited by Kubitzki (1982) based on a combination of quantitative characters, fruit characters and geographical distribution. For these classifications we defined specimens groups having a unique combination of characters states.

Finally, crossing the three classifications described above did the final classification for specimens, this was conducted following a method used by Gomes et al. (2013). First, a matrix using the specimens as rows and each classification as columns was built. Then, a distance matrix was calculated to identify pairs of specimens that were classified as belonging to the same group in each classification. For instance, if a pair of specimens received a value of 0 in the distance matrix, it means that for a given classification this pair belongs to the same group, any value above 0 would mean that the specimens in this pair belong to different groups. Using the same logic, summing the rows of this matrix give the number of pairs of specimens that were classified as the same group in all classifications. This allowed to infer groupings of specimens by selecting specimens that were classified in the same group by all classifications.

To visualize the similarity of the final (congruent) groups delimited, we implemented a non-metric multidimensional scaling (NMDS) with a dissimilarity matrix based on Gower’s distance, using the R package vegan (Oksanen et al. 2015).

Prediction 3 – *Morphological-groups* delimited using the diagnostic characters of *monograph-species* should be morphologically similar to the referred *monograph-species*.

If *morphological-groups* were defined accordingly to the procedures suggested by a monograph, i.e. using diagnostic characters, then these groups should be morphologically similar to the *monograph-species* that has these diagnostic characters. The following specific predictions should be valid if this is true:

3.1 – There should be at least one specimen in the morphological space defined by the description of each *monograph-species*.

By morphological space we mean the range of variation of the quantitative characters given in the descriptions of *monograph-species* and the combinations of characters states of qualitative characters. If there is some reason to accept that at least one of the specimens being examined belong to any of the *monograph-species*, so it is expected that some of the specimens have all the characteristics that describe such *monograph-species*. Failure in this test would imply in problems in the description given by the monograph, or indicate that none of the specimens examined actually belong to the *monograph-species* being tested.

3.2 - There should be only one *morphological-group* in the morphological space defined by the diagnostic characters of a *monograph-species*.

When a *morphological-group* is defined using the diagnostic characters of a *monograph-species*, this *morphological-group* should correspond to the *monograph-species*. Thus, it is not expected that more than one *morphological-group* match the morphological description of a single *monograph-species*. Failure in this test would imply that the diagnostic characters used are not unique to the *monograph-species*.

3.3 - If all the diagnostic characters of a *monograph-species* were used to define *morphological-groups*, then all specimens in a group should be in the space defined by the diagnostic characters of the *monograph-species*.

Following the idea that a *morphological-group* should correspond to a *monograph-species*, all specimens in a *morphological-group* should match the morphological description of the *monograph-species*. Failure in this test would mean that the morphological space of the *morphological-group* is broader than that defined by *monograph-species*.

3.4 - The morphological space defined by any *morphological-group* should intersect with the morphological space defined by the descriptions of the *monograph-species*.

If all the diagnostic characters were used to define the *morphological-group*, then one should not expect to find a group that do not match the morphological description of any *monograph-*

species being tested. Failure in this test would mean that such *morphological-group* potentially represents an "entity" not recognized by the monographer or it appeared with the accumulation of new data.

To test this prediction, the qualitative states and quantitative values for the diagnostic characters were extracted from the descriptions of each *monograph-species* (Table 1, figure 1), and a morphological space for each *monograph-species* was defined (Table 2). Then, a match between the morphology of each available specimens and each *monograph-species* was evaluated. A match was considered when the values of all characters of the specimen vary within the range of variation of these characters as described for the *monograph-species*.

Sampling

We selected 1135 herbarium specimens of the *Aniba panurensis* species complex including unidentified *Aniba* with papilose leaves from INPA, MO and the reference collection of the Biological Dynamic of Fragmented Forest Project (BDFFP). Most of the specimens were sterile (773); some had only fruits (139) and the remaining ones only flowers (223). Because some specimens had missing values for some characters, the final number of flowering specimens used in the analyses was 214. This includes 36 of the 243 specimens examined by Kubitzki (1982).

Only the flowering specimens were analyzed because flowers have the most informative characters for species delimitation and only one species (*Aniba coto*) can be diagnosed by fruit characters (Kubitzki 1982). The selection of specimens was made in a tentative to cover all the geographical distribution of the species involved.

Morphological characters

The flowers were boiled with water and then dissected using a dissecting microscope, three flowers per specimen were used when possible, but in cases when the specimen had few open flowers, only one or two flowers were taken in order to preserve the quality of the specimen. Flower structures were photographed and the quantitative variables were measured using the program Leica Las EZ 2.01. We obtained the qualitative data observing these structures directed from the microscope or the photographs. Eleven flower characters were scored (Table 1).

As the objective was to test delimitation of the *monograph-species*, only the morphological characters that were stated in the monograph as useful for the recognition of one or more *monograph-species* were used.

All the statistical analyses were done using the software R (R Development Core Team, 2010).

RESULTS

According to the first prediction, a qualitative character used to delimit *monograph-species* should be invariant within individuals. A search in our data matrix reveled that only the opening of the anther cells vary within individuals. There were 35 specimens that have more than one character state for the opening of the anther cells (Table 3). These specimens include 7 of the 36 specimens used in the monograph. So, the monograph failed in this prediction for 1 character.

In the second prediction, using the diagnostic characters of *monograph-species* to delimit *morphological-groups*, it should be found the same number of *morphological-groups* as the number of *monograph-species*, which in this case are nine. However, the delimitation of the specimens using all the diagnostic characters listed in the monograph resulted in 26 final *morphological-groups*. The detection of groups using quantitative characters, reveled two groups (Figure 2; Table 4 for best models), one with 176 specimens and the other with 38 specimens. Grouping these specimens according to the combination of qualitative characters permitted the recognition of four groups for ovary plus floral tube characters, and for the stamens characters (Table 6), showing that all combinations of characters could be found in these specimens. Crossing the three classifications resulted then in the recognition of 26 *morphological-groups*, with most of them formed by few specimens (Figure 3, figure 4). Thus, the monograph failed in this prediction.

The third prediction is about morphological comparison between *morphological-groups* and *monograph-species*, which are expected to be similar, resulting in a match between the two groups. From the 214 specimens analyzed, only 4 (1.86%) matched all diagnostic characters of *monograph-species*. One specimen matched the description of *Aniba burchellii*, three specimens matched the description of *A. panurensis*, but two of these three also matched the description of *A. firmula* (Table 6). None of these specimens were included in the monograph, which means that none of the 36 specimens used in the monograph matched the descriptions of the *monograph-species* in which they were classified.

To explore the problem we analyzed the quantitative and qualitative characters separately. Doing this, we found 96 specimens (17 from the 36 cited in the monograph) that matched *monograph-species* by quantitative characters alone, and 68 (7 from the 36 cited in the monograph) that matched *monograph-species* by qualitative characters (Figure 3). Because there were some specimens that matched more than one *monograph-species*, when these were excluded, the total number of correct matches, considering quantitative and qualitative characters separately, was 130 specimens (20 from the 36 cited in the monograph). This means that 84 specimens (39.26%) did not match any *monograph-species*, independently of the set of characters used.

All the three specimens that matched the description of *Aniba panurensis*, and consequently the two that matched *A. firmula*, belongs to the *morphological-group* 3 (MG-3), and the specimen that matched *A. burchelli* belong to the *morphological-group* 1 (MG-1), confirming the prediction that all matches of a *monograph-species* should belong to only one *morphological-group* (prediction 3.2). However, these specimens failed in prediction 3.3, i.e. that all specimens in a *morphological-group* should match the description of a *monograph-species* – the MG-3 have 53 specimens and only three matched *A. panurensis* and two *A. firmula*, while the MG-1 have 25 specimens and only one matched the description of *A. burchellii*.

According to the prediction 3.4, we should not find a *morphological group* that does not match any of the *monograph-species*. The monograph failed in this test since only *morphological-groups* 1 and 3 have specimens that matched the *monograph-species*. Even when considering quantitative and qualitative characters separately, the *morphological-groups* 16, 20, 21, 22, 23, 25 and 26 did not match any *monograph-species* (Figure 3). Interestingly, only one specimen forms the *morphological-group* 23, and this specimen was cited in the monograph. Therefore, these results were considered a failure of the monograph.

DISCUSSION

The hypotheses of species proposed in Kubitzki's monograph of *Aniba* were tested deriving and testing three predictions about the characters used to delimit species and the procedures of species delimitation. The monograph failed in all predictions, revealing problems in the taxonomy of the genus that are discussed following predictions. Then the species status of the *Aniba panurensis* complex and the monograph are discussed. Finally, the methodology here proposed to test monographs is discussed.

The first prediction consider that a qualitative character keying to species, should be invariant within individuals, but this was not the case for the opening of the anthers cells. Although this character has been considered an important character to delimit species in *Aniba*, we found this character to vary within individuals. It is commonly stated in the Lauraceae literature that the stamens of the whorls I and II are equal, and they are treated just as “outer stamens” (Kubitzki & Renner 1982; Rohwer 1993). However, our observations suggest that they are not always the same, in some cases they can have different shapes and this can be an important character to differentiate some species. Because outer stamens lump together variation in two different whorls, the presence of two character states in the same individual may just indicate that one character state is associated with the stamens of the whorl I, and the other with the stamens of the whorl II. Therefore, characters of outer and inner stamens should be treated separately in morphological analyses, contrary to the traditional work in *Aniba*.

In the second prediction, about the number of *morphological-groups* and *monograph-species*, we expected to get 9 *morphological-groups* in the multivariate analyses, as suggested by the monograph. Instead 26 *morphological-groups* were recognized (Figure 3 and 4). This happened because combinations of qualitative characters not recognized in the monograph were found. According to the monograph, glabrous ovary is always associated with glabrous inner surface of the floral tube and these are the diagnostic characters for *Aniba cylindriflora*, while a pilose ovary is associated with a pilose inner surface of the floral tube, a combination found in all other species. There were specimens with the combination of glabrous ovary and pilose inner surface of the floral tube, and specimens with the combination of pilose ovary and glabrous inner surface of the floral tube (Table 5).

The same happened with stamens characters. In the monograph *Aniba burchelli* is defined as the only *Aniba* with papilose leaves that has the anther broader than the filament, with ventral-lateral or lateral opening anther cells and a protruding connective. All others species in the monograph should have the anther as wide as the filament and ventral anther cells. However, we found all possible combinations for these characters (Table 5, figure 5).

Because *Aniba cylindriflora* and *A. burchellii* are the only *monograph-species* that were recognized by qualitative characters, all others *monograph-species* should be recognized using quantitative characters. *Aniba parviflora*, for example, is recognized by unequal tepals (outer ones smaller than inner ones), and *A. panurensis* differ from *A. rosaeodora* and *A. firmula* by the size of flowers (Kubitzki & Renner 1982). However, the analysis of quantitative characters supported only two distinct groups (Table 4; Figure 2). Thus, if one accepts that these species in fact exist, these characters alone are not enough to recognize them.

The morphological comparisons between *morphological-groups* and *monograph-species* (prediction 3) revealed that only four specimens matched the diagnostic characters of *monograph-species*. This highlight the fact that the morphological variation in this group is still poorly known, and that there is much more variation than the literature suggests. This is even worse if we consider that the only specimen that matched *Aniba burchellii* is a specimen named as *A. pilosa* van der Werff, a species describe after the monograph was published (van der Werff 1994), and which should be easily distinguished from *A. burchelli* by the pilose lower leaf surface, although the outer stamens are very similar. Two of the three specimens that matched *A. panurensis* also matched *A. firmula,* two species that have been considered synonyms by Kostermans (1938), and which were separated by Kubitzki due to flower size and geographical distribution: *A. panurensis* in the Amazon and *A. firmula* in the Atlantic Rain Forest. However, the two specimens that matched the descriptions of these species are from Ecuador, on the western side of Andes, one identified by Henk van der Werff (a specialist of Lauraceae) as *A. coto*. The third specimen that matched *A. panurensis* is from the Amazon and has been identified as *A. burchelli*.

When the comparison was made using just the qualitative characters, the same 8 specimens matched the description of *Aniba coto*, *A. muca*, *A. panurensis*, *A. parviflora*, *A. firmula* and *A. rosaeodora*. This was expected, since according to the monograph these species have the same states for the characters used, differing only by quantitative characters, fruit morphology or geographic distribution. However, as mentioned above, quantitative characters only supported two groups. This brings to discussion the subjectivity and imprecision of the definition of characters states of qualitative characters. Treating such characters in a quantitative way may make the descriptions of morphological variation much more objective (Stevens 1991; Wiens 2001), allowing a better differentiation of species. Whenever possible qualitative variation should be described in a quantitative way.

Although the seven *morphological-groups* which did not match any *monograph-species*, when considering quantitative and qualitative characters together or separately, contain only nine specimens, it should be considered that the *morphological-groups* were delimited based on combination of characters, therefore this result emphasize that there are combinations of characters that were not recognized in the monograph.

It is important to consider that most of the specimens analyzed here were not included in the monograph. This could have influenced our results, if the new combinations of characters found here were not present in the specimens included in the monograph or considering that the decision if a characters state is fixed or not in a population is dependent on the sample size (Wiens & Servedio 2000). In fact, only 36 of the 214 specimens were actually examined in the monograph. However, all combinations of characters described here were found among these 36 specimens and the opening of the anther cells varied within 7 of them. In addition, none of these 36 specimens matched the morphological characters of their assigned species. All this together strengthens the evidence that *monograph-species* are indeed poorly circumscribed.

A fourth kind of prediction is worth to mention, about the geographical distribution of the *morphological-groups*. Considering that a monograph succeed in the third prediction, one should expect an intersection among the geographical distributions of the *morphological-groups* and *monograph-species*. Failure in this test would reject the hypothesis that the *morphological-group* and its morphologically similar *monograph-species* are the same species. This prediction should be easy to test and interpret when the species being analyzed are well sampled, which is not the case for Amazonian taxa (Hopkins 2007). When the geographical area is poorly known it is hard to decide whether a mismatch between a *morphological-group* and a *monograph-species* is evidence for a different species, or reflects problems in the monograph, or only represents a previously unknown distribution area. Unfortunately, this prediction could not be tested here because of the poor match between specimens and the *monograph-species* tested.

One possible explanation for the failure of the monograph is over lumping. According to Kubitzki (1982) *Aniba viridis* and *A. firmula* are the same species. However, the type specimen of *A. viridis* does not have papilose leaves, a very important character used to delimit species of the genus. Given the subjective way the monograph was done, it is impossible to know the reasons for this synonymization. Excessive lumping may make species descriptions wider, since they include potentially different species.

Although Kubitzki (1982) used only the outer stamens to delimit species, all combinations of characters found in the outer stamens were also found in the inner ones (Figure 5). Kostermans (1938) recognized some variation in the inner stamens, but used it only for delimitation of subgenus and sections, not for species. The variation in the outer stamens together with others quantitative characters not used in the monograph, like the width of the corolla, should be useful characters for a better species delimitation in this group.

The complex taxonomy of *Aniba* can have consequences in all kinds of works that relies in the correct identification of the species. Great attention has been paid to inventory global species diversity in front of a biodiversity crisis (Claridge 1995; Mayo et al. 2008), but without the basic work of a monograph this objective cannot be achieved. For instance, *A. muca* is listed in the Flora of Brazil (Quinet et al. 2013) having three specimens occurring in the states of Amazonas and Amapá, but it is very unlikely that this information is correct, since this is a species that occurs in high altitudes in the Andes. This is probably a case of misidentification and this species should be removed from the Flora of Brazil.

Another problem concerns the situation of *Aniba rosaeodora*. It was not possible to find a way to differentiate this species from the others, and the monograph does not help in this sense, the characters used are weak and subjective (size of the flowers, revolute leaf margin and smell). Without a better understanding of species limits in this group there is no way to evaluate its conservation status, neither to make conservation plans for this species. In fact, we cannot even say if this is a valid species. Although Galaverna et al. (2015), could differentiate this species from *A. parviflora* based on chemical data, this was done using sterile specimens from two allopatric populations without mention of how they were identified. Thus, the extent to which chemical data are useful to differentiate this species still needs to be verified.

In conclusion, the group of *Aniba* with papilose leaves has serious problems of species delimitation and our understanding of the morphological variation in this group is still very superficial. The complexity of the morphological variation of this group is explored in more detail in appendix A, in which are discussed difficulties of postulate hypotheses of species in this group. As the stamens characters are very important for species delimitation in the genus, the major division (*guianensis*-group and *affinis*-group) is based on these characters, it is possible that the whole genus has this kind of problems and a new revision is urgently needed.

A lot of discussion has been given to species concepts (de Queiroz 2007; Hey 2006; Luckow 1995) and methods for species delimitations (Henderson 2005; Sites & Marshall 2004) with increasing use of molecular data. However, the basic work of α-taxonomy, the most common employed in monographs, using morphological data are being neglected and treated as non-scientific and merely descriptive (Wheeler & Valdecasas 2007; Wägele et al. 2011), and little attention has been paid to the way species are delimited and described in taxonomic work.

Here we propose a methodology to explicitly test the species delimitation in a monograph. Although the most direct way to do this is through the use of the identification key given by the monograph (Kellogg 1994), this only enable one to accept or reject the monograph without considering the potentially useful information contained in it. Following our methodology this test can be done in a more constructive way. By extracting predictions from the monograph it is possible to evaluate exactly how accurate is a monograph and how robust are the species in it delimited, making use of a hypothesis driven process to conduct taxonomic work (Wägele et al. 2011), avoiding problems related to the difficulty of assigning specimens to species (Edwards & Knowles 2014) and the lack of an explicit species concept (McDade 1995).

The predictions here postulated are general enough to be applied to any kind of monograph. We focus on morphology because this is the most used kind of information found in monographs, but the general logic could be applied to other data. When delimiting *morphological-groups* it is not necessary to use all characters available. Sometimes this is not even possible since characters that define species may be absent on the specimen being examined for reasons like bad preservation or developmental stage, for example when the species is defined by fruit character and the specimen has only flower or are sterile. This makes the test flexible enough to be applicable even in situations when the data is incomplete.

Morphometric techniques are commonly used in taxonomic work to propose and test hypothesis of species, the most common analysis being Cluster Analysis, Principal Component Analysis and Discriminant Analysis (James & McCulloch 1990; Henderson 2006). Cluster Analysis usually creates clusters of equal shape, volume and orientation. Although different species can behave in this way, there is no reason to expect that all species form such clusters. In order to incorporate the possibility of different kinds of clusters, it may be more appropriate to use of Gaussian mixture models, where different models are tested and the best model is chosen through the Bayesian Information Criterion (Fraley & Raftery 2002). This analysis offers flexibility to incorporate variation in shape, volume and orientation of clusters, and so of being more biologically realistic (Ezard et al. 2010; Fraley & Raftery 2002).

The proposed methodology, however, has some limitations. To test species delimitations from monographs, ideally one should use the same specimens examined by the monographer to be able to precisely infer the accuracy of the descriptions, and the way the species were delimited. But this is not a big limitation since a monograph offers a list of the specimens used and they are usually available in collections. However, the way the taxonomic data are available can impose more limitations to this kind of test, since the information are not linked to the specimens, but to names. In fact, this causes problems even to a taxonomist revising a group, as the information are unlinked, the work is not cumulative and have to be done *de novo* in each revision. Also, in the absence of the same specimens as the monograph, including a different set of specimens can be useful to infer if the hypotheses of species proposed in the monograph are still supported with new data. Hence, the inclusion of new specimens do not invalidate the tests because if the monographer found some patterns using a certain group of specimens, using more specimens one should expect to find at least the same patterns found by the monographer.

Perhaps, a more serious problem is indeed related to the way species are described in taxonomic work. In addition to the problems related to qualitative characters, quantitative variables also pose problems, since variation is usually given in description only in form of ranges. This not only poorly describes the existing variation, but also limits the applicability of tests like the one proposed here. Monographs are about hypotheses of species and in order to postulate testable scientific hypotheses, a theoretical scientific basis and a repeatable methodology are fundamental (Sites & Crandall 1997; McDade 1995; Henderson 2005). The monographer should think in innovative ways to do monographs (Stuessy 1993), and integrate and make available the raw data linked to specimens (Mayo et al. 2008; Clark et al. 2009; Godfray & Knapp 2004) permitting the monographic work to be cumulative, which is rarely the case as traditionally conducted.

In conclusion, the species delimitation done in monographs can and should be tested. We provided a valuable general way to do so in any monograph, this kind of work can help in a better understanding of the taxonomic situation in a group and can be useful to justify new revisions when this is necessary.

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LIST OF TABLES

Table 1. Diagnostic characters and the characters states used in the monograph to differentiate the species and in this work to delimit *monograph-species* and *morphological-groups*.

Characters	Characters states	Measurement unit
Pubescence of the ovary	glabrous or pilose	
Pubescence of the inner surface of the floral tube	glabrous or pilose	
Opening of the anther cells	ventral, ventral-lateral or lateral	
Width of the anther related to the filament	wider or same width	
Protuberance of the connective	protrunding or not protrunding	
Length of the inflorescence		mm
Length of the flower		mm
Length of the external tepals		mm
Width of the external tepals		mm
Length of the internal tepals		mm
Width of the internal tepals		mm

Table 2. Morphological space of the *monograph-species* extracted from the description of species given by the monograph. Length of the inflorescence (Length inflo.); length of the external tepals (Length ext.tep.); length of the internal tepals (Length int.tep.); length of the flowers (Length flw.); pubescence of the inner surface of the floral tube (Pub. tube); pubescence of the ovary (Pub. ovary); width of the anthers in relation to the filament (Width anther); direction of the openning of the valves of outer stamens (valve op); protuberance of the connective of outer stamens (Protu. connec).

Monograph-species	Length inflo. (mm)	Length ext.tep. (mm)	Length int.tep. (mm)	Length flw. (mm)	Pub. tube	Pub. ovary	Width anther	Valve op.	Protu. Connec.
A. cylindriflora	40 - 60	0.8 - 1	0.8 - 1	2 - 2.5	0	0	0	0	0
A. heringeri	30 - 80	1.4 - 1.8	1.4 - 1.8	4.5 - 8	1	1	0	0	1
A. firmula	40 - 100	1 - 1.5	1 - 1.5	2.5 - 5.5	1	1	0	0	0
A. coto	0 - 70	1.1 - 1.3	1.1 - 1.3	1.5 - 2.5	1	1	0	0	0
A. panurensis	70 - 120	0.7 - 1.2	0.7 - 1.2	2.5 - 4.5	1	1	0	0	0
A. rosaeodora	40 - 170	0.7 - 0.8	0.7 - 0.8	2 - 3.2	1	1	0	0	0
A. muca	0 - 40	0.8 - 1	0.8 - 1	2.2 - 3	1	1	0	0	0
A. parviflora	40 - 80	0.6 - 1	0.8 - 1.2	2.5 - 3	1	1	0	0	0
A. burchellii	80 - 140	1 - 1.2	1 - 1.2	2.7 - 6.2	1	1	1	1; 2	1

The character states for the qualitative characters are: Pub.tube - 0= glabrous, 1= pilose; Pub.ovary - 0= glabrous, 1 = pilose; Width anther - 0= same width, 1= wider; valve op. - 0= ventral, 1= ventral-lateral, 2= lateral; Protu. Connec. - 0= not protrunding, 1= protrunding.

Table 3. Number of specimens that have more than one character state for the character "opening of the anther". In total, 214 specimens were examined.

Character states	Number of specimens	Number of specimens used in the monograph
ventral and ventral-lateral	22	5
ventral and lateral	6	1
ventral-lateral and lateral	6	0
ventral, ventral-lateral and lateral	1	1

Table 4. The three best models to describe the data according to the clustering analysis performed by the R package mclust and the support of each classification given by the Bayesian Information Criterion (BIC).

Model	Number of clusters	BIC
EVE	2	282.0095
EEE	2	281.7043
VEE	2	276.7565

The letters “E” and “V” means “equal” and “variable”, respectively, and they are related to, in order, the volume, shape and orientation of the clusters such that VEE, e.g., is a model with clusters of variable volume and equal shape and orientation.

Table 5. Groups of specimens classified according to the ovary, floral tube and the stamens.

Specimens groups	Description of the groups	Number of specimens
Based on ovary and floral tube		
Ovary group 1	glabrous ovary and glabrous floral tube	24
Ovary group 2	pilose ovary and pilose floral tube	143
Ovary group 3	glabrous ovary and pilose floral tube	6
Ovary group 4	pilose ovary and glabrous floral tube	41
Based on stamens		
Stamens group 1	anther wider than the filament; ventral-lateral or lateral opening and protruding connective	46
Stamens group 2	anther as wide as the filament and ventral opening	81
Stamens group 3	anther wider than the filament and ventral opening	66
Stamens group 4	anther as wide as the filament and ventral-lateral or lateral opening	21

Table 6. Number of specimens that matched *monograph-species*. 214 specimens and 9 *monograph-species* were examined.

Monograph-species	Number of matches	Identification of the specimens
A. burchellii	1	Wisum-445
A. panurensis	3	Palacios-5093; Clark-10288; Mota-58
A. firmula	2	Palacios-5093; Clark-10288
Remaining *monograph-species*	No match	

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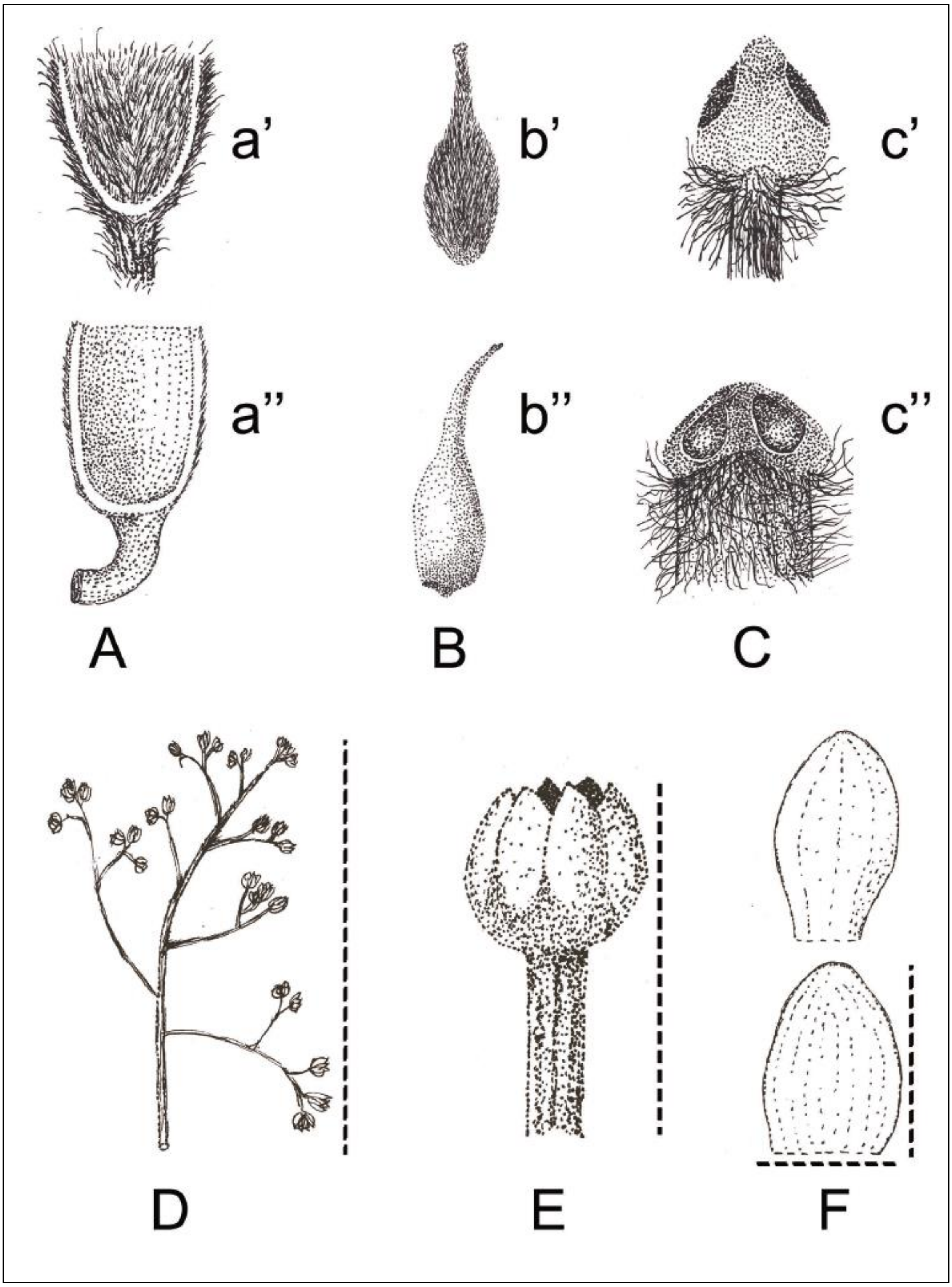

Figure 1. Morphological varaibles used in the Aniba's monograph to diferentiate the species and used in this work to delimit the morphological groups. The qualitative variables and the character states (A-C), A) pubescence of the inner surface of the floral tube, a') pilose, a'') glabrous; B) Pubescence of the ovary, b') pilose, b'') glabrous; C) Combination of character states in the outer stamens, c') anther

broader than the filament, lateral oppening of the valves and a protrunding connective, c'') anther as wide as the filament, ventral opening of the valves. The quantitative variables (D-F), D) length of the inflorescence; E) Length of the flower; F) Length and width of the outer and inner tepals. The dashed lines represents how the structures were measured. Illustrated by Rangel Carvalho.

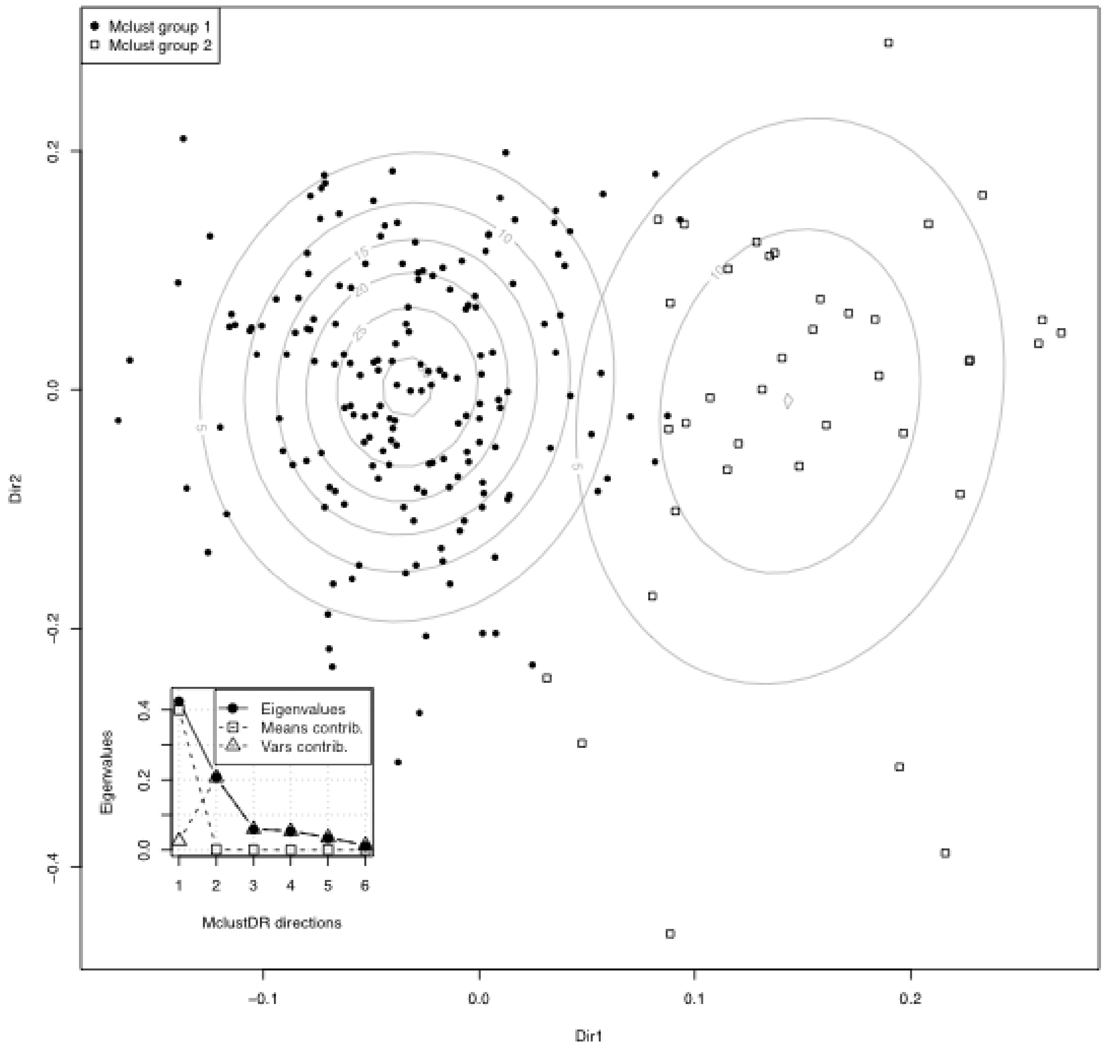

Figure 2. Plot of the two groups generated by the mclust procedure, in a reduced subspace with densities estimation. Dir1 explain the variation in the difference of the means of the groups (53.57%) and Dir2 explain the variation in the variance of the groups (26.22%).

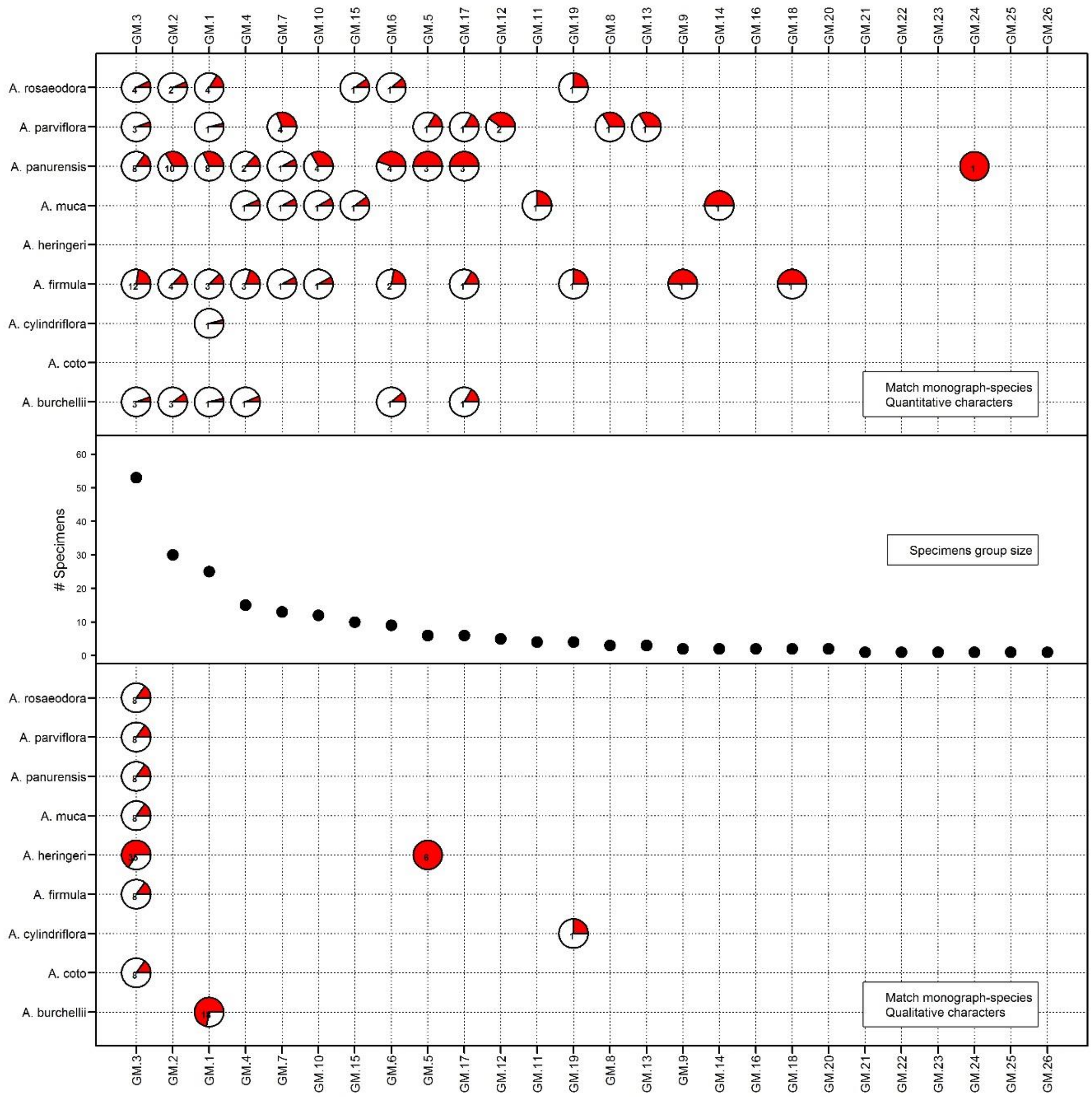

Figure 3. Match between *monograph-species* and *morphological-groups*. Middle panel shows the number of specimens in each *morphological-group*. Top and bottom panels show the number of specimens in each *morphological-groups* matching the morphological space of each *monograph-species*, considering the quantitative (top) and the qualitative characters (bottom). Pies indicate the number of specimens that matched *monograph-species* and are colored according to the proportion that this number represent in relation to the group size.

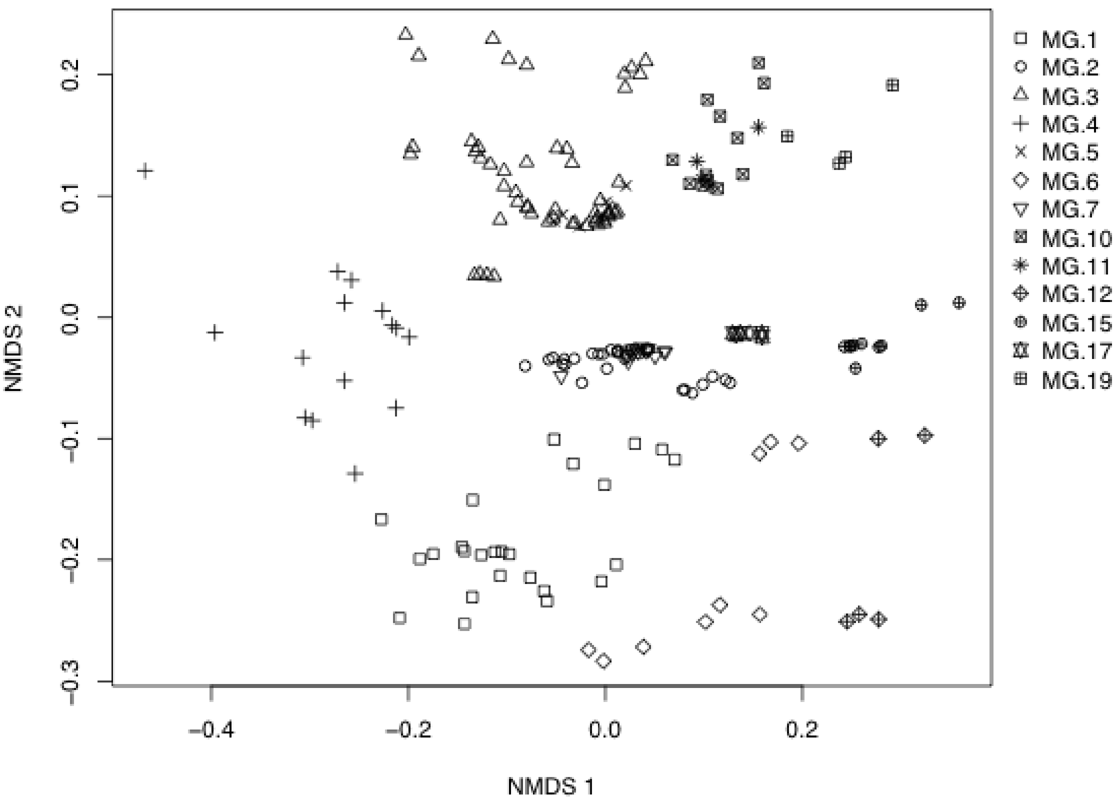

Figure 4. NMDS with all characters used to delimit the *morphological-groups*. Only the *morphological-groups* with more than three specimens were used here. The stress value was 0.195.

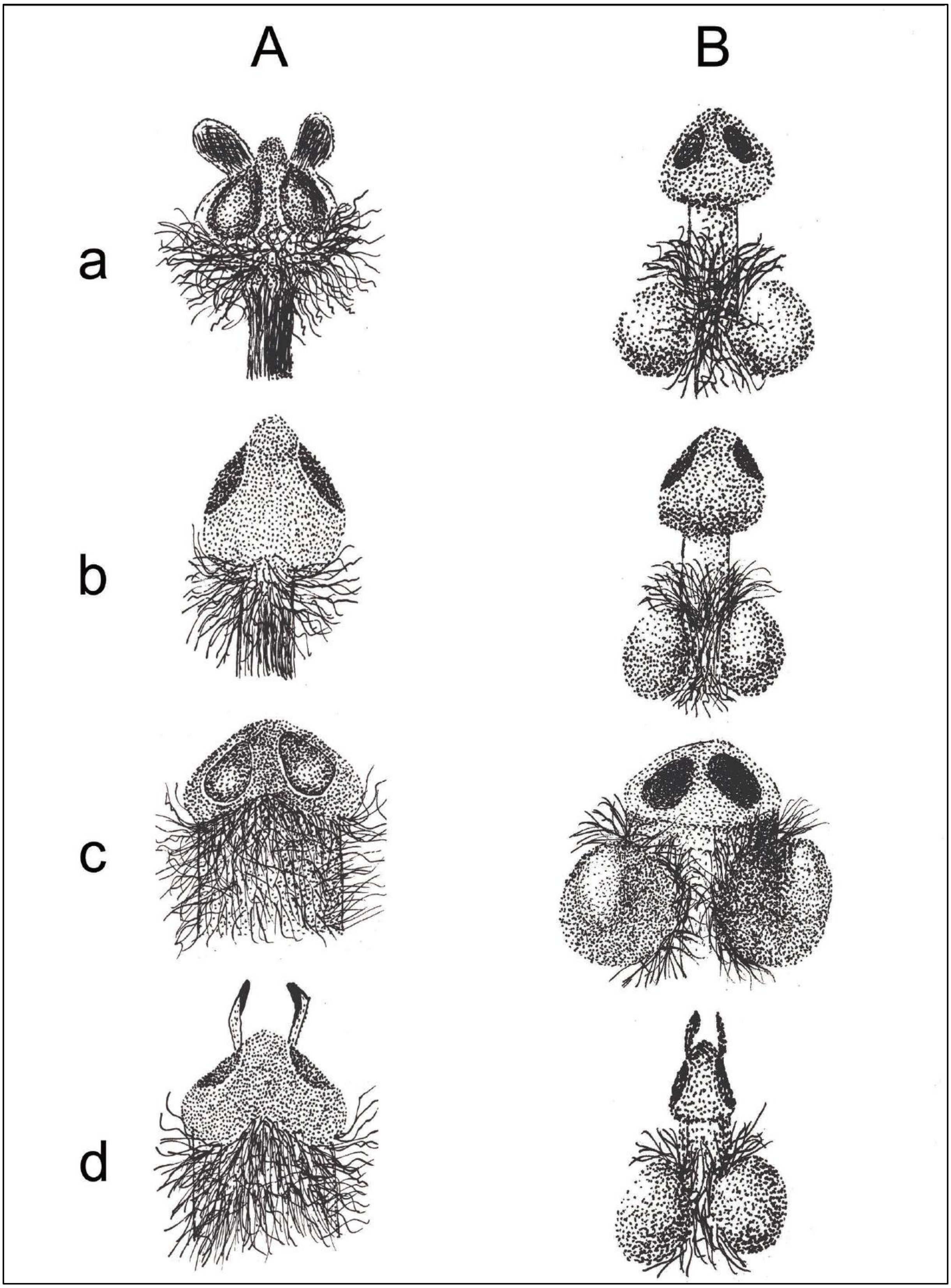

Figure 5. Four different combination of character states found in the outer and inner stamens. Columns, with capital letters A and B, represents the outer stamens, column A, and the inner stamens, column B. The lines, with lower case letters, represents the four different combinations of character states, a) anthers broader than the filament and ventral oppening of the valves; b) anthers broader than the filament

and lateral oppening of the valves; c) anthers as wide as the filament and ventral oppening of the valves; d) anthers as wide as the filament and lateral oppening of the valves. Illustrated by Rangel Carvalho.

CONCLUSÕES GERAIS

A metodologia proposta é válida e construtiva. Extraindo e testando predições, é possível avaliar a delimitação de espécies em trabalhos monográficos, ainda que este não exponha de forma clara o conceito de espécie adotado, um obstáculo comum neste tipo de trabalho. Apesar do método depender da disponibilidade dos mesmos espécimes usados na monografia e da qualidade das descrições dadas para uma avaliação mais rigorosa, ele é capaz de expor aspectos positivos e negativos da monografia, fornecendo informações úteis para o desenvolvimento de novas revisões, quando esta se faz necessária.

A aplicação deste teste revelou problemas sérios na monografia de *Aniba*. Os limites entre as espécies do complexo *Aniba panurensis* não são claros e nosso conhecimento sobre a variação morfológica neste grupo é ainda muito superficial. Tendo em vista que este é um gênero de grande representatividade na região neotropical e inclui o pau-rosa, espécie de importância econômica e ameaçada de extinção, uma nova revisão traria benefícios não só para a taxonomia do grupo e conservação de *A. rosaeodora*, mas também para os produtores do óleo essencial desta espécie.

APÊNDICE A – Variação morfológica e espectral do complexo *Aniba panurensis*

Como mostrado no capítulo 1, os limites entre as espécies do complexo *Aniba panurensis* não são claros porque a variação morfológica e o nível atual de amostragem em coleções de herbário não permitem a formulação de grupos morfológicos consistentes com análises multivariadas, mesmo análises sofisticadas (mclust, Fraley et al. 2012). Assim, hipóteses de espécies para o complexo *Aniba panurensis* não foram explicitamente formuladas nesta dissertação. No entanto, além dos dados utilizados no teste da monografia de Kubitzki (1982) para o complexo *A. panurensis* (Capítulo 1), foram coletados outros dados morfológicos e dados de espectroscopia no infravermelho próximo de folhas (cf. Durgante et al. 2013) para um conjunto maior de amostras (Figura 1), dados que foram explorados e direcionaram a construção do Capítulo 1, mas dados que não foram ainda analisados em toda a sua potencialidade pela complexidade do processo analítico necessário.

O objetivo deste apêndice é apresentar esses dados coletados através de análises de agrupamento e mostrar a complexa variação do grupo e a dificuldade de postular hipóteses de espécies quando os limites entre grupos são ambíguos, os dados são assimétricos e os resultados não condizem com formas mais tradicionais de agrupamento.

Por simplicidade, as análises de agrupamento mostradas aqui foram geradas pelo método de agrupamento por modelos de distribuição normal multivariados, implementadas no programa R (R Development Core Team, 2010) usando pacote mclust (Fraley et al. 2012) **-** mesma metodologia usada no Capítulo 1. Embora essa metodologia limite o uso das variáveis coletadas (apenas quantitativas e normais), análises usando outros modelos e incluindo variáveis qualitativas (e.g. pela função *find.cluster* do pacote *adegenet* do R; Jombart & Ahmed 2011) indicam resultados similares com os mesmos problemas aqui apresentados.

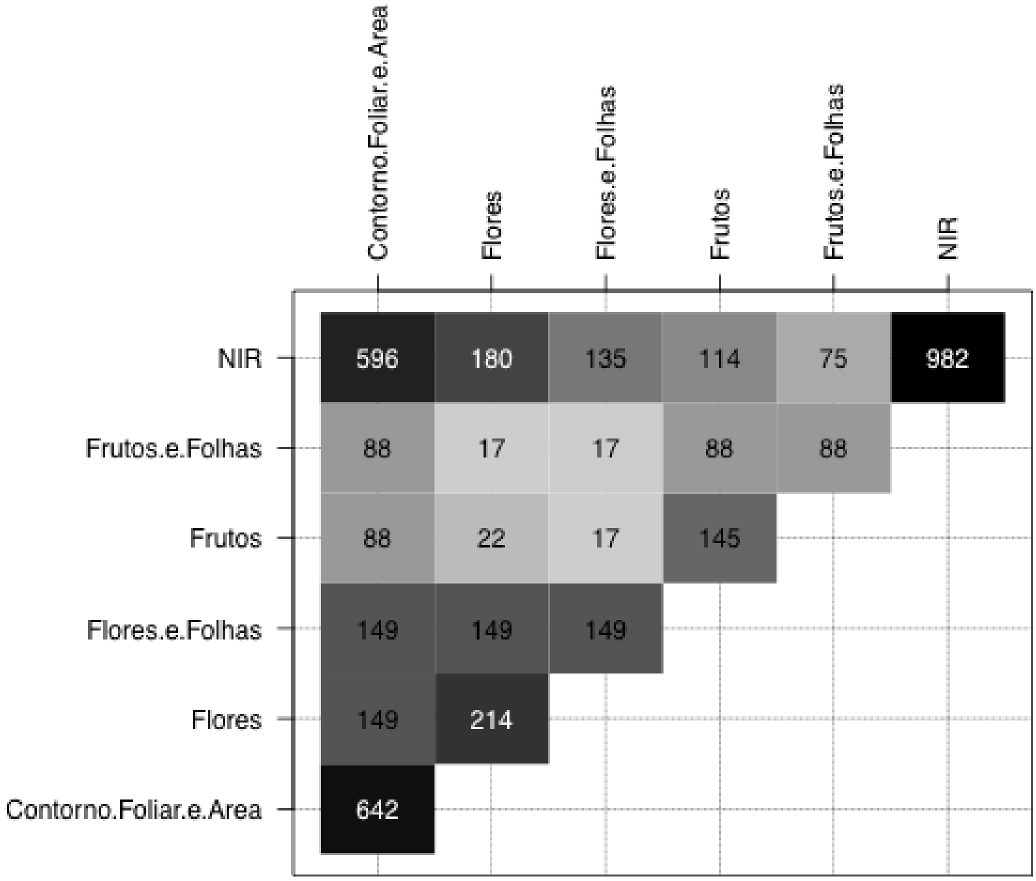

Figura 1. Tamanho amostral de cada conjunto de dados e das diferentes combinações entre eles. As células estão coloridas de acordo com o tamanho amostral, quanto maior mais escura.

Variação morfológica das flores

Como mostrado no capítulo 1, os dados quantitativos das flores suportam apenas dois grupos. Ao analisar os espécimes desses grupos, foi possível perceber que a principal diferença entre eles é a diferença no tamanho das tépalas externas em relação às internas, sendo que o grupo Flor-2 é caracterizado pelas tépalas desiguais, enquanto que o grupo Flor-1 possui tépalas iguais (Figura 2). Estes grupos coexistem na região amazônica (Figura 3), portanto a diferença entre eles não pode ser explicada por variação geográfica.

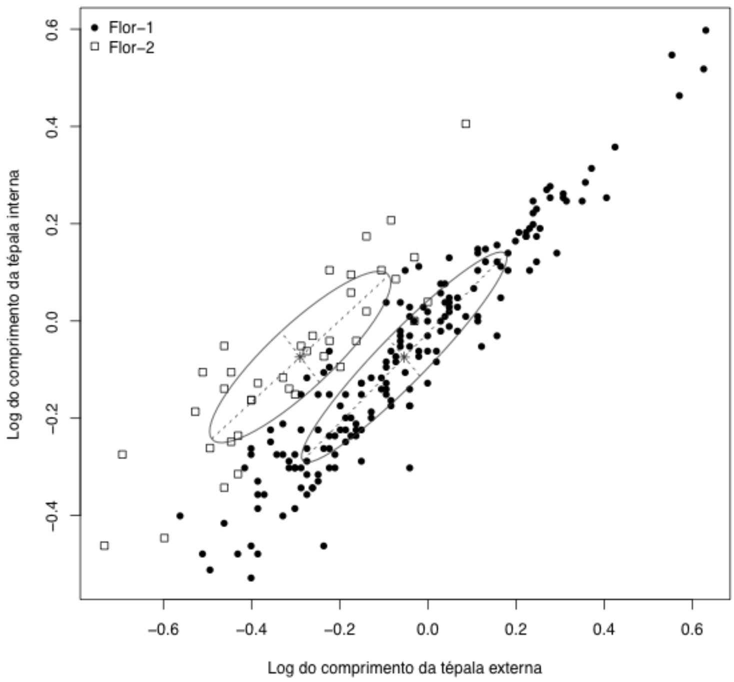

Figura 2. Gráfico mostrando a relação entre o comprimento das tépalas externas em relação ao comprimento das tépalas internas. Os grupos Flor-1 e Flor-2 representam a classificação gerada pelo mclust.

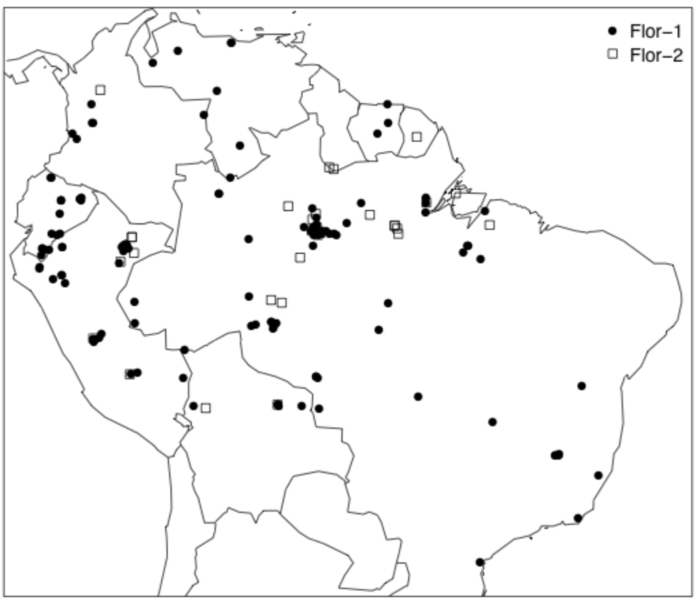

Figura 3. Mapa de distribuição dos espécimes com flores usados nas análises. Os grupos Flor-1 e Flor-2 representam a classificação gerada pelo mclust.

Variação morfológica dos frutos

Apesar da variação encontrada no comprimento dos frutos (10.12 mm a 60.38 mm) não foi possível detectar grupos usando as variáveis selecionadas (Tabela 1), o que sugere que esta variação é contínua (Figura 4). Como a análise empregada não permite o uso de variáveis qualitativas, não foi possível avaliar a importância desses caracteres na delimitação de grupos.

Tabela 1. Caracteres morfológicos dos frutos usados na análise de agrupamento do mclust.

Caracteres	Unidade de medida	Descrição
Comprimento do fruto	Milímetro	Medido da base da cúpula até o ápice do fruto
Largura do fruto	Milímetro	Medida logo acima da margem da cúpula
Comprimento da cúpula	Milímetro	Medido da base da cúpula até sua margem
Largura da cúpula	Milímetro	Medida na margem da cúpula

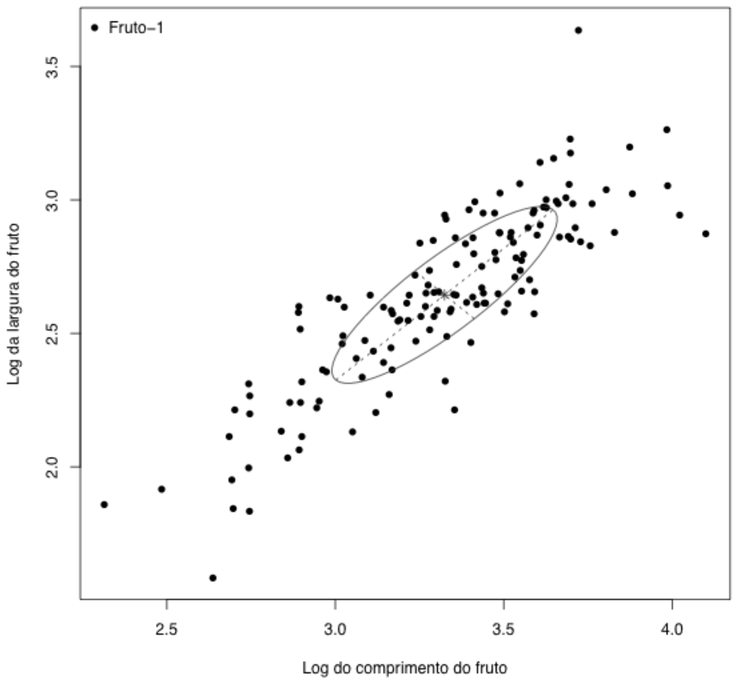

Figura 4. Relação do comprimento do fruto pela largura do fruto segundo a classificação dada pelo mclust.

Variação morfológica das folhas

Os dados de folhas foram gerados a partir de imagens digitalizadas analisadas no programa SHAPE (Iwata & Ukai 2002). Esse programa extrai a forma das folhas de forma numérica e realiza uma análise de componentes principais (PCA), onde os eixos expressam a variação da forma nas imagens analisadas (Figura 5), e também retorna a área das folhas analisadas. Até três folhas por espécime foram utilizadas, esse número variou segundo a qualidade das exsicatas.

Para explorar a variação foliar, os dados foram divididos em dois grupos: com e sem a área foliar. Assim, foi possível avaliar o efeito da forma foliar independente do tamanho. Os agrupamentos foram gerados utilizando os eixos 1, 3 e 4, pela variação em forma explicada (Figura 5).

Observando as exsicatas, percebe-se uma grande variação no tamanho e forma das folhas, porém essa variação aparenta ser contínua. Entretanto, a análise detectou mais de um grupo nos dois conjuntos de dados (Figura 6). Também foi possível perceber que apenas a forma da folha é insuficiente para reconhecer grupos. Ao adicionar a área foliar, não só foi possível detectar um grupo a mais, mas também a incerteza na classificação dos espécimes nos grupos foi menor. Portanto, essa informação deve ser considerada juntamente com a forma foliar.

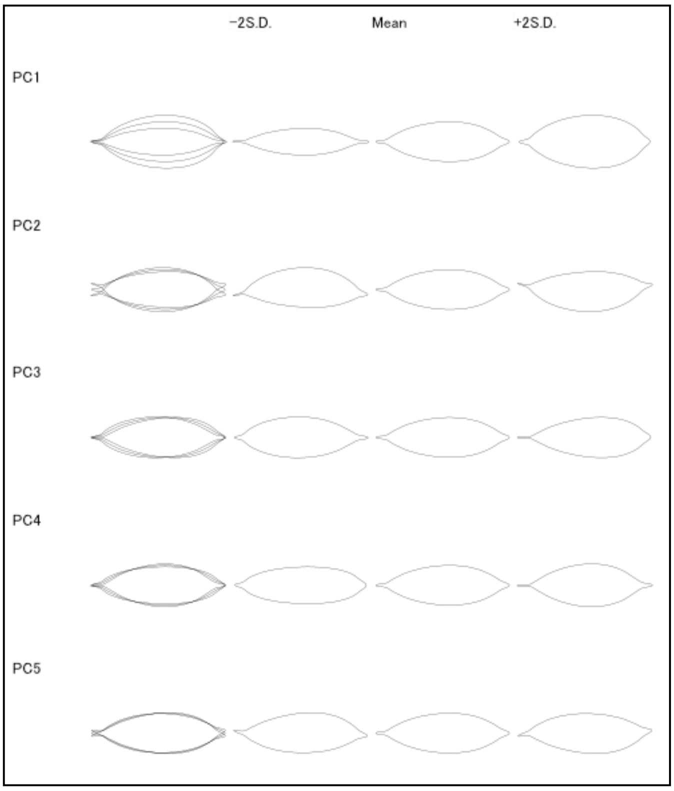

Figura 5. Variação da forma das folhas explicada pelos eixos da PCA gerada pelo programa SHAPE. A primeira coluna representa a sobreposição do valor médio (terceira coluna) com os valores do desvio padrão (segunda e quarta coluna). A porcentagem de explicação dos eixos foram: PC1 (62.48%); PC2 (14.49%); PC3 (9.70%); PC4 (4.57%); PC5 (2.48%).

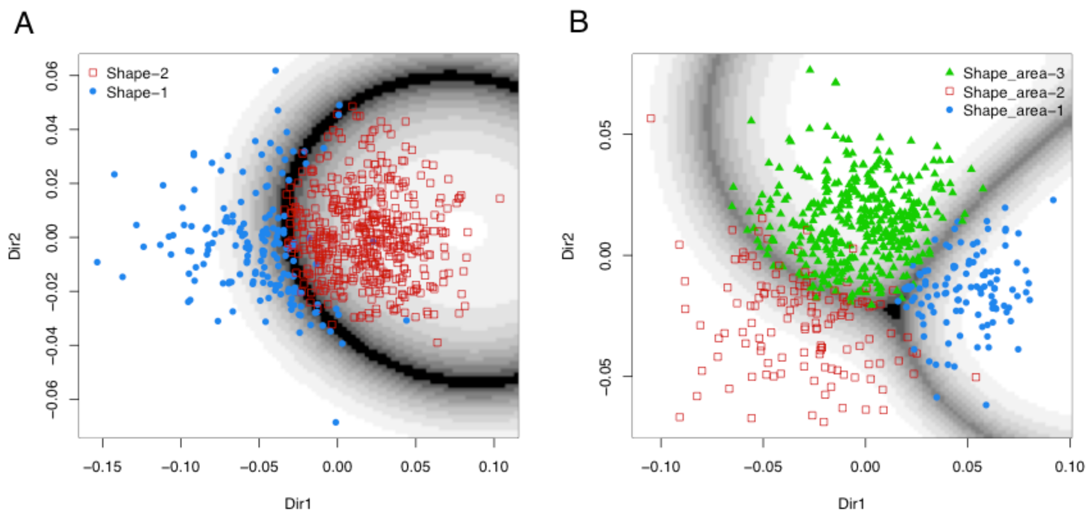

Figura 6. Classificação dos espécimes segundo o mclust usando os eixos PC1, PC3 e PC4 da PCA e a área gerada pelo programa SHAPE. A) classificação usando apenas a forma foliar, eixos PC1, PC3 e PC4 da PCA. B) classificação usando a forma e a área foliar. A região marcada em preto indica incerteza na classificação dos espécimes, quanto mais escura maior a incerteza.

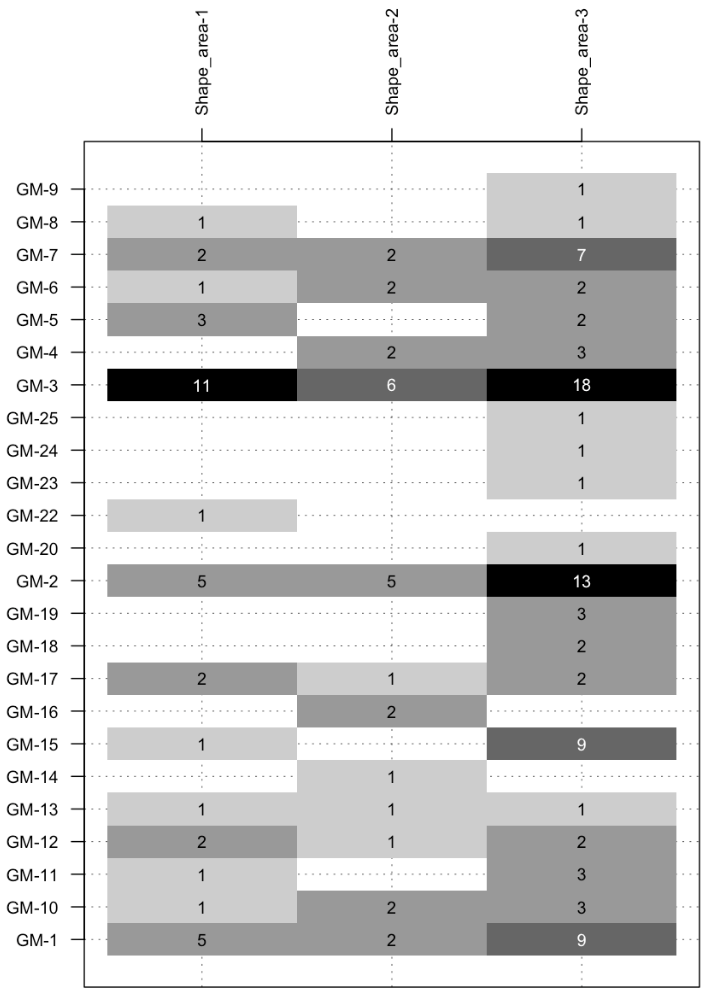

Figura 7. Matriz de confusão entre os grupos definidos com os dados gerados pelo programa SHAPE (eixos PC1, PC3 e PC4) com a área foliar, também obtida pelo programa SHAPE, e os grupos morfológicos de flores definidos no Capítulo 1 usando a morfologia das flores e classificados usando o mclust.

Variação espectral

A espectroscopia foliar no infravermelho próximo (NIR) tem se mostrado uma ferramenta útil na identificação de espécies proximamente relacionadas (Durgante et al. 2013). Para tanto, se faz necessário um conjunto de amostras corretamente identificadas, ou seja, grupos bem delimitados, o que não foi possível obter para esse complexo de espécies. Entretanto, dados de NIR estão relacionados com a composição química das amostras, e dados químicos tem se mostrado úteis no reconhecimento de espécies de *Aniba* (Gottlieb & Kubitzki 1981; Galaverna et al. 2015). Portanto, foi investigada a capacidade de reconhecer grupos no complexo *Aniba panurensis* usando dados NIR.

A leitura dos espectros foi realizada pelo equipamento da Termo Nicollet, sistema FT-NIR Antaris II Method Development System (MDS) disponível na Carpoteca do INPA seguindo a metodologia de Durgante et al. (2013). Para cada espécime foram medidas até 6 leituras: três folhas com 2 leituras cada.

Esse número variou de acordo com as condições das exsicatas. Sendo assim, alguns espécimes tiveram apenas 1 leitura. O processo de leitura consiste, basicamente, em colocar uma folha seca sobre o emissor de radiação (esfera de integração), colocando-se sobre a folha um objeto opaco e escuro para evitar a dispersão da luz. O equipamento emite a radiação nos números de onda especificados e mede quanto da radiação foi refletida. A diferença entre o emitido e o refletido são os valores de absorção da radiação pelo tecido vegetal nos diferentes números de onda utilizados. Com isso, cada leitura gera um conjunto de valores de absorbância em diferentes números de onda, o espectro. Cada espectro consiste em 1.557 medições de absorção foliar de luz na região de ~4.000 a 10.000 cm-1. Cada medição produzida pelo instrumento é a média de 16 leituras com uma resolução de comprimento de onda de 8 cm-1 com calibrações de fundo a cada leitura, conforme protocolo em utilização no INPA (ver Durgante et al. 2013). Como o número de variáveis é grande (1557 variáveis), foi realizado uma PCA usando apenas um espectro por espécime selecionado aleatoriamente. Os grupos foram formados utilizando-se diferentes combinações dos eixos da PCA.

O número de grupos detectados variou de 5 a 13 grupos dependendo de quantos eixos foram usados na análise de agrupamento (Figura 7). Considerando a classificação feita usando os três primeiros eixos, que explicam 99.42% da variação, obtemos um número de grupos próximo do número de espécies testadas, igual se considerarmos que *Aniba pilosa* e *A. heterotepala* foram representadas apenas por 1 espécime e, portanto é improvável que fossem detectadas. Porém, não há uma correlação forte entre os grupos detectados pelo NIR e os grupos segundo a determinação nas etiquetas das exsicatas (Figura 8). Quando considerado os *grupos-morfológicos* obtidos no capítulo 1 usando caracteres das flores e inflorescência a interpretação é prejudicada pela grande redução no número de amostras, ainda assim não parece haver uma correlação (Figura 9).

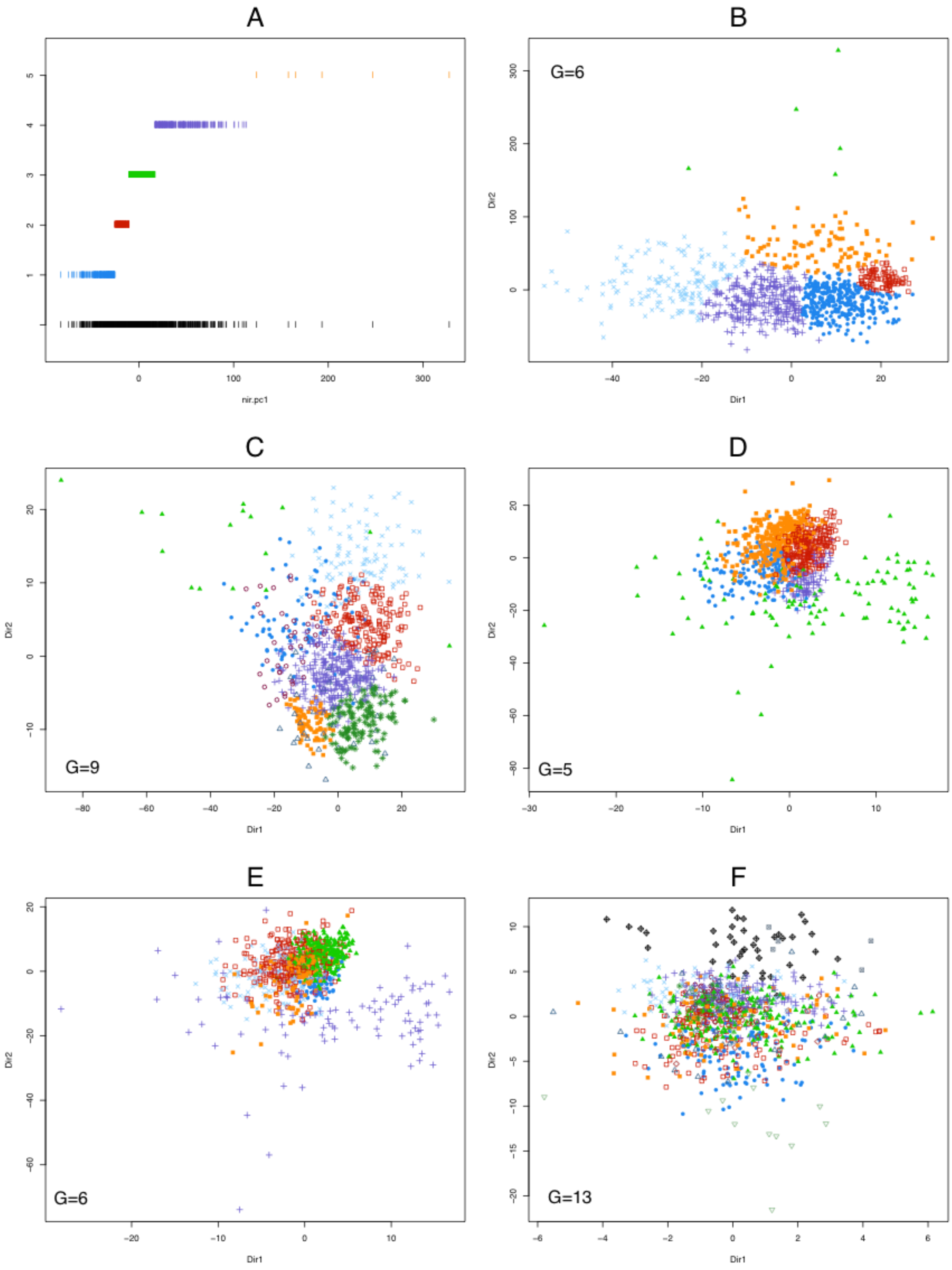

Figura 8. Classificação dos espécimes gerada pelo mclust segundo os eixos da PCA dos dados NIR, "G" indica o número de grupos em cada classificação. A) Classificação usando apenas o primeiro eixo (82.08% da variação). B) classificação usando os dois primeiros eixos (98.09% da variação). C) classificação usando os três primeiros eixos (99.42% da variação). D) classificação usando os quarto primeiros eixos (99.66% da variação). E) classificação usando os cinco primeiros eixos (99.78% da variação). F) classificação usando os seis primeiros eixos (99.87% da variação). Em A-F, foi usado um método de redução de dimensionalidade e apenas os dois primeiros eixos estão sendo mostrados.

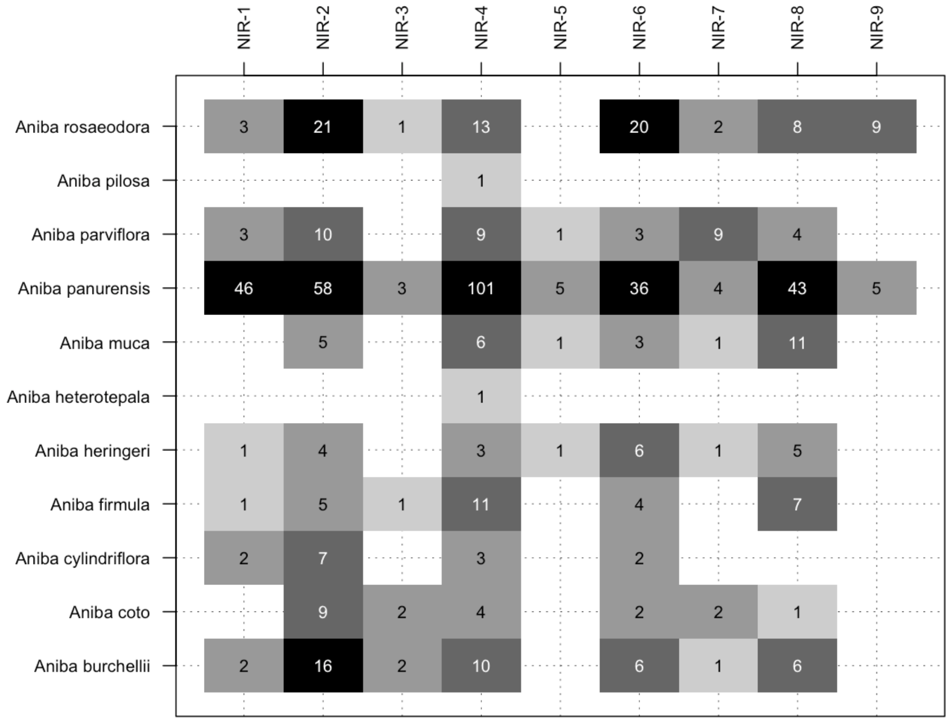

Figura 9. Matriz de confusão entre os grupos detectados usando os três primeiros eixos da PCA dos dados NIR pela análise do mclust e os grupos determinados segundo os nome nas etiquetas das exsicatas. As células estão coloridas de acordo com o número de espécimes, quanto maior mais escura.

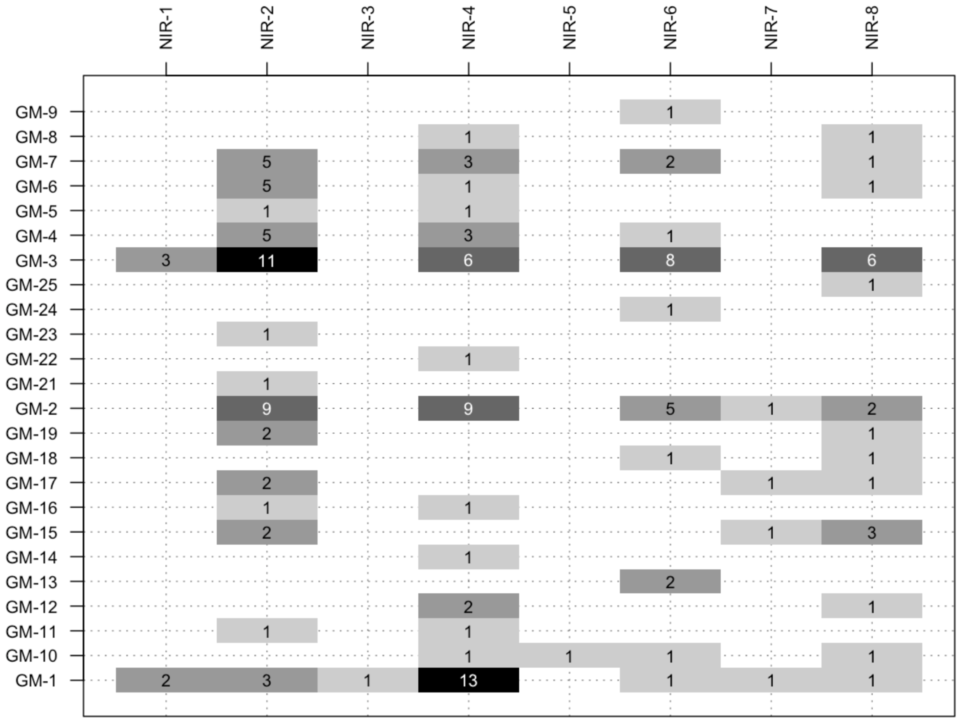

Figura 10. Matriz de confusão entre os grupos detectados usando os três primeiros eixos da PCA dos dados NIR pela análise do mclust e os grupos definidos no capítulo 1 segundo a morfologia das flores. O Grupo NIR-9 não está representado, pois os espécimes que o formam não foram usados na definição dos grupos morfológicos.

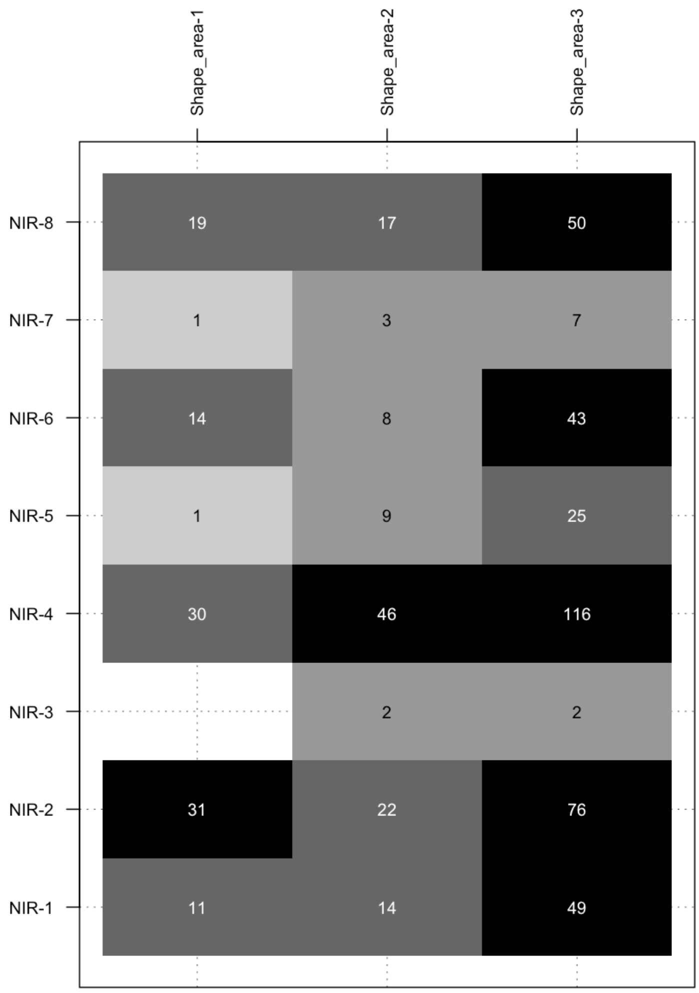

Figura 11. Matriz de confusão entre os grupos detectados usando os três primeiros eixos da PCA dos dados NIR pela análise do mclust e os grupos definidos com os dados gerados pelo programa SHAPE (eixos PC1, PC3 e PC4) com a área foliar, também obtida pelo programa SHAPE.

Considerações finais

O uso de diferentes tipos de dados de forma integrativa pode trazer benefícios para a prática taxonômica (Dayrat 2005; Padial et al. 2010; Pante et al. 2014), isso porque o processo de delimitação de espécies requer o uso de múltiplas evidências (Sites & Marshall 2003) pela própria natureza do processo de especiação (De Queiroz 2007). Na prática, espécies são delimitadas de acordo com a evidência disponível, seja em termos do número de amostras ou do tipo de dado (morfológico, ecológico, molecular). Por isso, espécies delimitadas e descritas são hipóteses que podem mudar quando novas evidências são produzidas, o que é particularmente relevante na Amazônia diante do atual estado de conhecimento (Prance et al. 2000; Hopkins 2007). É fundamental, portanto, tornar explícito, num trabalho de revisão, não apenas o conceito de espécie adotado, mas principalmente os critérios utilizados, fundamentando as decisões taxonômicas tomadas (McDade 1995).

Neste trabalho foi adotado o conceito evolutivo de espécie, em que uma espécie é entendida como um segmento de uma linhagem no nível meta-populacional que evolui separadamente de outras linhagens (de Queiroz 2007; Naomi 2011), e foram utilizadas duas fontes de evidência independentes, dados de espectroscopia foliar no infravermelho próximo, e dados da morfologia das flores, frutos e folhas, para o reconhecimento destas linhagens.

Entretanto, a exploração desses dados apenas evidenciou a complexidade do grupo. Os dados sugerem diferentes agrupamentos, porém há pouca congruência entre eles e a grande quantidade de material estéril e problemas metodológicos na aquisição dos dados (a coleta dos dados de shape dependeram da qualidade das exsicatas e o NIR de exsicatas não coladas na cartolina) gerou uma assimetria que reduziu o número de amostras que possuem mais de um tipo de dado, dificultando uma análise integrada.

Apesar de o NIR ser uma ferramenta útil para identificar espécies (Kim et al. 2004; Rodríguez-Fernández et al. 2011; Durgante et al. 2013), seu potencial para reconhecimento de grupos sem uma definição *a priori* ainda precisa ser melhor investigado. Uma boa classificação de referência é necessária para investigar o significado das diferentes classificações que se pode encontrar usando esses dados, pois como observado nos dados de shape, os eixos da PCA que explicam uma maior variação dos dados não necessariamente explicam a variação de interesse para reconhecimento de grupos. Portanto, uma análise mais detalhada dessa variação se faz necessária.

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ANEXO 1 – Lista de material examinado

Collector	Number	Taxon	Country	Majorarea	Minorarea	Latitude	Longitude	Herbarium	Institution Code
Allen, C.K.	325	Aniba burchellii	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	18156
Allen, C.K.	326	Aniba burchellii	Brasil	Amazonas	Manaus	-3.007	-60.018	INPA	18157
Berg, C.C.	P19463	Aniba burchellii	Brasil	Amazonas	Manaus	-1.835	-60.123	INPA	42953
Rios, C.A.G.	16178	Aniba burchellii	Peru	Loreto	Maynas	-3.832	-73.376	MO	5895568
Ferreira, C.A.C.	652	Aniba burchellii	Brasil	Amazonas	Itapiranga	-2.233	-58.033	INPA	90340
Coêlho, D.F.	s.n.	Aniba burchellii	Brasil	Amazonas	Manaus	-2.962	-60.054	INPA	4306
Cruz, E.D.	93	Aniba burchellii	Brasil	Pará	Tomé-Açú	-2.419	-48.157	INPA	184346
Lleras, E.	19590	Aniba burchellii	Brasil	Amazonas		-4.652	-61.267	INPA	43074
Pires, M.J.P.	1842	Aniba burchellii	Brasil	Pará	Almeirim	-0.533	-52.55	MO	3810252
Pires, M.J.P.	2107	Aniba burchellii	Brasil	Pará	Almeirim	-0.879	-52.552	MO	3809750
Mota, C.D.A. da	58	Aniba burchellii	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	162174
Pessoal do C.P.F.	s.n.	Aniba burchellii	Brasil	Amazonas	Manaus	-2.962	-60.054	INPA	6254
Prance, G.T.	11677	Aniba burchellii	Brasil	Amazonas	Manaus	-3.011	-60.056	INPA	29985
Prance, G.T.	13694	Aniba burchellii	Brasil	Amazonas	Lábrea	-7.262	-64.788	INPA	31910

Collector	Number	Taxon	Country	Majorarea	Minorarea	Latitude	Longitude	Herbarium	Institution Code
Prance, G.T.	3185	Aniba burchellii	Brasil	Amazonas	Manaus	-3.072	-59.997	INPA	18735
Prance, G.T.	3706	Aniba burchellii	Brasil	Amazonas	Manaus	-3.064	-58.759	INPA	19331
Prance, G.T.	3810	Aniba burchellii	Brasil	Amazonas	Itacoatiara	-2.951	-58.914	INPA	19434
Rodrigues, W.A.	1995	Aniba burchellii	Brasil	Amazonas	Manaus	-2.829	-60.035	INPA	8369
Rodrigues, W.A.	2835	Aniba burchellii	Brasil	Amazonas	Manaus	-3.018	-60.073	INPA	10185
Rodrigues, W.A.	8626	Aniba burchellii	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	27738
Sasaki, D.	183	Aniba burchellii	Brasil	Mato Grosso	Alta Floresta	-9.537	-55.819	INPA	219781
Sothers, C.A.	286	Aniba burchellii	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	177550
Wilde, L.	19-88	Aniba burchellii	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	159037
Suclli, E.	2549	Aniba coto	Peru	Cusco	Calca	-12.447	-72.501	MO	6294624
Gensini, J.E.G.	19	Aniba coto	Colombia	Valle del Cauca		3.525	-76.712	MO	3287927
Palacios, W.A.	5087	Aniba coto	Ecuador	Napo	Archidona	-0.65	-77.8	MO	4912198
Palacios, W.A.	5093	Aniba coto	Ecuador	Napo	Archidona	-0.667	-77.783	MO	4912194
Palacios, W.A.	3716	Aniba coto	Ecuador	Morona-Santiago		-2.983	-78.433	MO	4912199
Coêlho, D.F.	s.n.	Aniba cylindriflora	Brasil	Amazonas	Tefé	-3.34	-64.828	INPA	53330
Figlioulo, R.	Fit.134	Aniba cylindriflora	Brasil	Amazonas	Novo Airão	-2.48	-60.976	INPA	47352
Clarke, H.D.	8561	Aniba cylindriflora	Guyana			1.533	-59.25	MO	4961235

Collector	Number	Taxon	Country	Majorarea	Minorarea	Latitude	Longitude	Herbarium	Institution Code
Kubitzki, K.	75-95	Aniba cylindriflora	Brasil	Amazonas	Barcelos	-1.132	-62.088	INPA	58572
Kubitzki, K.	79-64	Aniba cylindriflora	Brasil	Amazonas	Manaus	-3.036	-60.306	INPA	91975
Lima, L. de	273	Aniba cylindriflora	Brasil	Acre	Brasiléia	-9.117	-72.7	INPA	201484
Lewis, M.	37644	Aniba cylindriflora	Bolivia	Santa Cruz	Nuflo de Chavez	-14.75	-62.75	MO	5336319
Nee, M.H.	38661	Aniba cylindriflora	Bolivia	Santa Cruz	Guarayos	-14.717	-62.767	MO	3828759
Nee, M.H.	38678	Aniba cylindriflora	Bolivia	Santa Cruz	Guarayos	-14.683	-62.8	MO	3828761
Nee, M.H.	38707	Aniba cylindriflora	Bolivia	Santa Cruz	Guarayos	-14.733	-62.833	MO	3828762
Nee, M.H.	38774	Aniba cylindriflora	Bolivia	Santa Cruz	Guarayos	-14.733	-62.817	MO	3828763
Pires, O.	286	Aniba cylindriflora	Brasil	Amazonas	Manaus	-2.834	-60.495	INPA	37350
Prance, G.T.	14986	Aniba cylindriflora	Brasil	Amazonas	Manaus	-2.802	-60.46	INPA	33202
Prance, G.T.	6970	Aniba cylindriflora	Brasil	Rondônia	Ji Paraná	-9.426	-63.143	INPA	23729
Vásquez, R.	17604	Aniba cylindriflora	Peru	Loreto	Maynas	-3.25	-72.9	MO	5022144
Vásquez, R.	5283	Aniba cylindriflora	Peru	Loreto	Maynas	-3.8	-73.417	MO	3305376
Vásquez, R.	5516	Aniba cylindriflora	Peru	Loreto	Maynas	-3.8	-73.417	MO	3305383
Vásquez, R.	5372	Aniba cylindriflora	Peru	Loreto	Maynas	-3.917	-73.583	MO	3305384
McDaniel, S.T.	16297	Aniba cylindriflora	Peru	Loreto	Maynas	-3.983	-73.124	MO	6267337

Collector	Number	Taxon	Country	Majorarea	Minorarea	Latitude	Longitude	Herbarium	Institution Code
Killeen, T.J.	6944	Aniba cylindriflora	Bolivia	Santa Cruz	Velasco	-14.817	-61.15	MO	4937379
Hatschbach, G.G.	41945	Aniba firmula	Brasil	Paraná	Morretes	-25.476	-48.825	MO	2986666
Hatschbach, G.G.	27987	Aniba firmula	Brasil	Minas Gerais	Diamantina	-18.15	-43.611	MO	3104845
Kuhlmann, J.G.	6603	Aniba firmula	Brasil	Rio de Janeiro		NA	NA	MO	3126342
Silva, O.A.	s.n.	Aniba firmula	Brasil	Rio de Janeiro	Rio de Janeiro	-14.167	-53.083	MO	2312255
Oliveira, R.P. de	328	Aniba firmula	Brasil	Rio de Janeiro	Rio das Ostras	-22.429	-42.043	MO	5310583
Stehmann, J.R.	2690	Aniba heringeri	Brasil	Minas Gerais	Diamantina	-18.183	-43.625	MO	5310581
Lombardi, J.A.	3535	Aniba heringeri	Brasil	Minas Gerais	São Gonçalo do Rio Preto	-18.144	-43.371	MO	5310582
Lombardi, J.A.	4098	Aniba heringeri	Brasil	Minas Gerais	São Gonçalo do Rio Preto	-18.113	-43.341	MO	5310580
Ramos, P.C.M.	213	Aniba heringeri	Brasil	Distrito Federal	Brasília	-15.883	-47.933	MO	4922950
Harley, R.M.	53459	Aniba heringeri	Brasil	Bahia	Rio de Contas	-13.424	-41.792	MO	5705863
Vásquez, R.	6752	Aniba heterotepala	Peru	Loreto	Maynas	-4.333	-72.75	MO	4345587
Smith, D.N.	4613	Aniba muca	Peru	San Martín	Rioja	-5.833	-77.75	MO	3395970
Smith, D.N.	4718	Aniba muca	Peru	San Martín	Rioja	-5.833	-77.75	MO	3395993
Cornejo, M.	1427	Aniba muca	Bolivia	La Paz	Franz Tamayo	-14.769	-68.62	MO	6400707
Palacios, W.A.	13292	Aniba muca	Ecuador	Zamora-Chinchipe	Zamora	-4.083	-78.95	MO	5191225
Vargas, W.G.	3349	Aniba muca	Colombia	Quindío	Circasia	4.608	-75.648	MO	5320836
Monteagudo, A.	12533	Aniba panurensis	Peru	Pasco	Oxapampa	-10.183	-75.574	MO	6133599

Collector	Number	Taxon	Country	Majorarea	Minorarea	Latitude	Longitude	Herbarium	Institution Code
Monteagudo, A.	12568	Aniba panurensis	Peru	Pasco	Oxapampa	-10.184	-75.576	MO	6133601
Monteagudo, A.	12575	Aniba panurensis	Peru	Pasco	Oxapampa	-10.184	-75.576	MO	6133602
Fuentes, A.F.	3706	Aniba panurensis	Bolivia	La Paz	Franz Tamayo	-14.97	-67.795	MO	5956370
Aluizio, J.	112	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	21391
Aluizio, J.	124	Aniba panurensis	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	21426
Aluizio, J.	81	Aniba panurensis	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	21327
Aluizio, J.	89	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	21355
Pérez, A.J.	4952	Aniba panurensis	Ecuador	Orellana		-0.678	-76.394	MO	6319487
Beck, H.T.	150	Aniba panurensis	Brasil	Pará	Ilha de Marajó	-0.25	-50.5	INPA	169648
Reynel, C.	603	Aniba panurensis	Peru	Pasco	Oxapampa	-10.427	-75.525	MO	3247994
Ferreira, C.A.C.	3128	Aniba panurensis	Brasil	Acre	Brasiléia	-11.017	-69.233	INPA	98329
Ferreira, C.A.C.	7952	Aniba panurensis	Brasil	Pará	Oriximina	-0.833	-57.033	INPA	143795
Coêlho, D.F.	s.n.	Aniba panurensis	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	20746
Coêlho, D.F.	s.n.	Aniba panurensis	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	42207
Coêlho, D.F.	s.n.	Aniba panurensis	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	20871
Daly, D.C.	1459	Aniba panurensis	Brasil	Pará	Tucuruí	-4.227	-49.977	INPA	118247

Collector	Number	Taxon	Country	Majorarea	Minorarea	Latitude	Longitude	Herbarium	Institution Code
Meza, F.G.	4600	Aniba panurensis	Venezuela	Bolívar	Cedeño	6.783	-67.017	MO	3480617
Hartshorn, G.S.	2944	Aniba panurensis	Peru	Pasco	Oxapampa	-9.833	-75	MO	3423441
Aymard, G.	7930	Aniba panurensis	Venezuela	Amazonas	Atabapo	3.05	-65.417	MO	4075018
Carnevali, G.	1525	Aniba panurensis	Venezuela	Amazonas		5.133	-67.9	MO	3423995
Davidse, G.	13562	Aniba panurensis	Venezuela	Miranda	Páez	10.083	-66.017	MO	2623673
Davidse, G.	13713	Aniba panurensis	Venezuela	Miranda	Páez	10.083	-66.017	MO	2623693
Villa, G.	527	Aniba panurensis	Ecuador	Orellana		-0.633	-76.5	MO	5335647
Werff, H. van der	10169	Aniba panurensis	Peru	Loreto	Maynas	-3.833	-73.5	MO	5336315
Werff, H. van der	10274	Aniba panurensis	Peru	Loreto	Maynas	-4.125	-73.464	MO	3625145
Boerboom, J.	9604	Aniba panurensis	Suriname	Paramaribo		5.873	-55.215	MO	3396889
Korning, J.	8594	Aniba panurensis	Ecuador	Napo	Añangu	-0.517	-76.383	MO	4345464
Kurz, H.	32	Aniba panurensis	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	188860
Loureiro, A.A.	s.n.	Aniba panurensis	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	16574
Valenzuela, L.	12353	Aniba panurensis	Peru	Pasco	Oxapampa	-10.138	-75.171	MO	6331363
Maia, L.A.	568	Aniba panurensis	Brasil	Amazonas	São Gabriel da Cachoeira	-0.224	-66.868	INPA	86801
Rimachi, M.	10682	Aniba panurensis	Peru	Loreto	Maynas	-3.708	-73.263	MO	5167114

Collector	Number	Taxon	Country	Majorarea	Minorarea	Latitude	Longitude	Herbarium	Institution Code
Rimachi, M.	1795	Aniba panurensis	Peru	Loreto	Maynas	-3.682	-73.256	MO	2427891
Nascimento, J.R. do	s.n.	Aniba panurensis	Brasil	Amazonas	Manaus	-2.337	-60.113	INPA	191104
Oliveira, A.C.A.	313	Aniba panurensis	Brasil	Amazonas	Manaus	-2.585	-60.119	INPA	218452
Pires, O.	54	Aniba panurensis	Brasil	Amazonas	Manaus	-2.94	-59.241	INPA	35876
Prance, G.T.	16049	Aniba panurensis	Brasil	Amazonas	São Gabriel da Cachoeira	-0.239	-66.862	INPA	34268
Prance, G.T.	2114	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	17686
Prance, G.T.	2124	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	17694
Prance, G.T.	2162	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	17727
Prance, G.T.	2176	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	17740
Prance, G.T.	2658	Aniba panurensis	Brasil	Amazonas	Manaus	-2.806	-59.463	INPA	18143
Prance, G.T.	2693	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	18141
Prance, G.T.	5363	Aniba panurensis	Brasil	Rondônia	Porto Velho	-9.221	-64.344	INPA	22123
Ramos, J.F.	1162	Aniba panurensis	Brasil	Pará	Tucuruí	-3.81	-49.619	INPA	115734
Ramos, J.F.	1582	Aniba panurensis	Brasil	Pará	Tucuruí	-4.743	-48.769	INPA	123717
Ramos, J.F.	1857	Aniba panurensis	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	177269
Revilla, J.	8435	Aniba panurensis	Brasil	Pará	Tucuruí	-3.762	-49.694	INPA	115104

Collector	Number	Taxon	Country	Majorarea	Minorarea	Latitude	Longitude	Herbarium	Institution Code
Vásquez, R.	10561	Aniba panurensis	Peru	Loreto	Maynas	-3.75	-73.35	MO	3643392
Rodrigues, W.A.	5325	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	13994
Rodrigues, W.A.	5414	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	14083
Rodrigues, W.A.	5951	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	14895
Rodrigues, W.A.	5969	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	14913
Rodrigues, W.A.	5976	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	14920
Rodrigues, W.A.	5996	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	15046
Rodrigues, W.A.	5997	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	15047
Rodrigues, W.A.	6729	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	15179
Rodrigues, W.A.	6742	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	15192
Rodrigues, W.A.	7899	Aniba panurensis	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	17259
Rodrigues, W.A.	8208	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	17595
Rodrigues, W.A.	8221	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	17608
Rodrigues, W.A.	8926	Aniba panurensis	Brasil	Amazonas	Manaus	-2.758	-59.918	INPA	28299
Silva, M.F. da	365	Aniba panurensis	Brasil	Amazonas	Careiro	-3.824	-60.353	INPA	36456
Smith, S.F.	1364	Aniba panurensis	Peru	Madre de Dios	Puerto Moldonado	-69.333	NA	MO	3783177

Collector	Number	Taxon	Country	Majorarea	Minorarea	Latitude	Longitude	Herbarium	Institution Code
Croat, T.B.	19724	Aniba panurensis	Peru	Loreto		-3.974	-73.151	MO	2130321
Wayt, T.	4803	Aniba panurensis	Brasil	Mato Grosso	Vila Bela de Santíssima Trindade	-12.9	-60.03	INPA	151319
Wayt, T.	4979	Aniba panurensis	Brasil	Rondônia	Porto Velho	-9	-63.25	INPA	151412
Vicentini, A.	614	Aniba panurensis	Brasil	Amazonas	Manaus	-2.88	-59.97	INPA	177317
Vicentini, A.	617	Aniba panurensis	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	177319
Vicentini, A.	677	Aniba panurensis	Brasil	Amazonas	Manaus	-2.88	-59.97	INPA	177330
Huashikat, V.	1030	Aniba panurensis	Peru	Amazonas	Condorcanqui	-3.917	-77.718	MO	2813387
Huashikat, V.	732	Aniba panurensis	Peru	Amazonas	Condorcanqui	-3.917	-77.7	MO	2811489
Vieira, M.G.G.	776	Aniba panurensis	Brasil	Rondônia	Vilhena	-12.75	-60.167	INPA	89099
Ducke, A.	19978	Aniba parviflora	Brasil	Pará	Santarém	-2.477	-54.741	MO	6113722
Batista, L.T.	1	Aniba parviflora	Brasil	Pará	Santarém	-2.657	-54.557	INPA	254490
Duarte, A.P.	7366	Aniba parviflora	Brasil	Pará	Santarém	-3.024	-54.475	INPA	14588
Ducke, A.	s.n.	Aniba parviflora	Brasil	Pará	Santarém	-2.445	-54.714	INPA	15304
Clarke, H.D.	7722	Aniba parviflora	Guyana			1.417	-58.95	MO	4900462
Donselaar, J. van	1484	Aniba parviflora	Suriname	Brokopondo		4.663	-55.168	MO	3396882
Kurz, H.	34	Aniba parviflora	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	96761

Collector	Number	Taxon	Country	Majorarea	Minorarea	Latitude	Longitude	Herbarium	Institution Code
Vásquez, R.	16828	Aniba parviflora	Peru	Loreto	Maynas	-3.25	-72.9	MO	4399110
Rodrigues, W.A.	6734	Aniba parviflora	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	15184
Mori, S.A.	20834	Aniba parviflora	French Guiana		Saül	3.617	-53.2	MO	3782099
Silva, N.T. da	5397	Aniba parviflora	Brasil	Pará	Almeirim	-1.52	-52.579	INPA	158672
Vicentini, A.	1031	Aniba parviflora	Brasil	Amazonas	Manaus	-2.88	-59.97	INPA	181945
Vicentini, A.	716	Aniba parviflora	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	177334
Wisum, A.	445	Aniba pilosa	Ecuador	Morona-Santiago	Tiwintza	-3.087	-78.073	MO	6219616
Gentry, A.H.	24844	Aniba rosaeodora	Peru	Loreto	Maynas	-3.75	-73.333	MO	3158855
Arévalo, M.F.	501	Aniba rosaeodora	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	183142
Cavalcante, P.B.	s.n.	Aniba rosaeodora	Brasil	Pará	Belém	-1.453	-48.477	INPA	13720
Coêlho, D.F.	s.n.	Aniba rosaeodora	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	20865
Coêlho, D.F.	s.n.	Aniba rosaeodora	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	20869
Coêlho, D.F.	s.n.	Aniba rosaeodora	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	20868
Coêlho, D.F.	s.n.	Aniba rosaeodora	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	20866
Coêlho, D.F.	s.n.	Aniba rosaeodora	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	20867
Coêlho, D.F.	s.n.	Aniba rosaeodora	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	20864

Collector	Number	Taxon	Country	Majorarea	Minorarea	Latitude	Longitude	Herbarium	Institution Code
Ayala, F.	467	Aniba rosaeodora	Peru	Loreto	Maynas	-3.824	-73.325	MO	3232948
Davidse, G.	27187	Aniba rosaeodora	Venezuela	Amazonas	Río Negro	0.833	-66.083	MO	3480629
Schulz, J.P.	8140	Aniba rosaeodora	Suriname			3.883	-55.917	MO	3397586
Kurz, H.	22	Aniba rosaeodora	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	96479
Pires, M.J.P.	644	Aniba rosaeodora	Brasil	Pará	Almeirim	-0.877	-52.535	MO	3802468
Rimachi, M.	8003	Aniba rosaeodora	Peru	Loreto	Maynas	-3.846	-73.331	MO	3783197
Nascimento, J.R.	756	Aniba rosaeodora	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	177545
Pires, M.J.	644	Aniba rosaeodora	Brasil	Pará	Almeirim	-0.865	-52.55	INPA	149376
Ramos, J.F.	1745	Aniba rosaeodora	Brasil	Amazonas	Manaus	-2.955	-59.928	INPA	162048
Rodrigues, W.A.	6001	Aniba rosaeodora	Brasil	Amazonas	Manaus	-3.102	-60.025	INPA	15051
Silva, A.C. da	1	Aniba rosaeodora	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	208904
Souza, J.A. de	s.n.	Aniba rosaeodora	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	37126
Croat, T.B.	18198	Aniba rosaeodora	Peru	Loreto		-3.872	-73.373	MO	2098878
Wilde, L.	7-88	Aniba rosaeodora	Brasil	Amazonas	Manaus	-2.883	-59.967	INPA	159025
Wisum, A.	94	Aniba sp.	Ecuador	Morona-Santiago	Tiwintza	-3.008	-77.869	MO	6112968
Anonymous	s.n.	Aniba sp.	Peru	Loreto	Requena	-4.938	-73.685	MO	3599478
Bisby, F.A.	18117	Aniba sp.	Brasil	Amazonas	Manaus	-1.651	-60.181	INPA	41422
Díaz, C.	8790	Aniba sp.	Peru	Amazonas	Luya	-6.117	-78.35	MO	6480293

Collector	Number	Taxon	Country	Majorarea	Minorarea	Latitude	Longitude	Herbarium	Institution Code
Ferreira, C.A.C.	352	Aniba sp.	Brasil	Amazonas	Itapiranga	-1.233	-60.417	INPA	90353
Ferreira, C.A.C.	7601	Aniba sp.	Brasil	Amazonas	Presidente Figueiredo	-2.033	-60.417	INPA	140988
Guarin, F.A.	273	Aniba sp.	Colombia	Antioquia	Amalfi	6.833	-75.083	MO	5803345
Ortega, F.J.	3126	Aniba sp.	Venezuela	Mérida	Sucre	8.723	-71.442	MO	4649468
Werff, H. van der	16927	Aniba sp.	Peru	Amazonas	Huancavelica	-6.328	-77.518	MO	6479988
Werff, H. van der	9673	Aniba sp.	Colombia	Valle del Cauca	Buenaventura	3.917	-77	MO	6479975
Werff, H. van der	9282	Aniba sp.	Ecuador		Loja	-4.45	-79.15	MO	NA
Werff, H. van der	9023	Aniba sp.	Ecuador	Zamora-Chinchipe		-3.967	-79.1	MO	NA
Filho, H.	3	Aniba sp.	Brasil	Amazonas	Humaitá	-7.562	-63.27	INPA	70542
Campos, J.	4688	Aniba sp.	Peru	Cajamarca	San Ignacio	-5.352	-79.284	MO	NA
Campos, J.	5710	Aniba sp.	Peru	Cajamarca	San Ignacio	-5.292	-79.267	MO	NA
Asanza, J.L.J.	13363	Aniba sp.	Ecuador	Zamora-Chinchipe	Nangaritza	-4.117	-78.633	MO	5291545
Clark, J.L.	10288	Aniba sp.	Ecuador	Esmeraldas		0.838	-78.518	MO	6352065
Homeier, J.	297	Aniba sp.	Ecuador	Zamora-Chinchipe	Loja	-3.967	-79.067	MO	6479970
Valenzuela, L.	3986	Aniba sp.	Peru	Cusco	La Convención	-12.624	-72965	MO	6479986
Macêdo, M.	566	Aniba sp.	Brasil	Pará	Itaituba	-7.745	-55.166	INPA	75077
Macêdo, M.	717	Aniba sp.	Brasil	Mato Grosso	Vila Bela de Santíssima Trindade	-15	-59.95	INPA	83357
Monteiro, O.P.	1218	Aniba sp.	Brasil	Amazonas	Manaus	-2.998	-60.072	INPA	60037
Monteiro, O.P.	326	Aniba sp.	Brasil	Acre	Cruzeiro do Sul	-7.623	-72.714	INPA	56176
Øllgaard	9198	Aniba sp.	Ecuador	Pastaza	Mera	-1.583	-77.883	MO	4649470

Collector	Number	Taxon	Country	Majorarea	Minorarea	Latitude	Longitude	Herbarium	Institution Code
Pereira-Silva, G.	14425	Aniba sp.	Brasil	Rondônia	Jaci Parana	-9.274	-64.643	INPA	244475
Reategui, R.	s.n.	Aniba sp.	Peru	Loreto	Requena	-4.995	-73.985	MO	3599479
Fonnegra, R.	4410	Aniba sp.	Colombia	Antioquia	Fredonia	5.937	-75.699	MO	4570029
Smith, R.F.	9679	Aniba sp.	Venezuela	Lara		9.608	-69.723	MO	6479989
Rodrigues, W.A.	6714	Aniba sp.	Brasil	Amazonas	Manaus	-2.514	-60.332	INPA	15164
Soares, E.	277	Aniba sp.	Brasil	Pará	Oriximina	-1.725	-56.442	INPA	161711
Teixeira, L.O.A.	1156	Aniba sp.	Brasil	Amazonas	Humaitá	-7.75	-62.533	INPA	104892
Teixeira, L.O.A.	751	Aniba sp.	Brasil	Rondônia	Santa Bárbara	-9.422	-63.087	INPA	104488
Croat, T.B.	104088	Aniba sp.	Ecuador	Carchi		0.883	-78.45	MO	NA
Thomas, W.W.	4994	Aniba sp.	Brasil	Rondônia	Porto Velho	-9	-63.25	INPA	151427
Vieira, M.G.G.	305	Aniba sp.	Brasil	Rondônia	Porto Velho	-9.117	-62.9	INPA	88630
Vieira, M.G.G.	804	Aniba sp.	Brasil	Rondônia	Vilhena	-12.75	-60.167	INPA	89127
Palacios, W.A.	5098	Aniba sp.	Ecuador	Napo	Archidona	-0.667	-77.783	MO	6479984
Galiano, W.L.	6727	Aniba sp.	Peru	Cusco	La Convención	-12.648	-73.049	MO	6479985
Vargas, W.G.	1070	Aniba sp.	Colombia	Quindío	Salento	4.637	-75.567	MO	4985816

ANEXO 2 – Tabela de dados coletados

Morphological data matrix. Inflo. ln.- Length of the inflorescence; **Fl. ln.-** Lenth of the flower; **Ext. tep. ln.-** Length of the external tepals; **Ext. tep. wd.-** Width of the external tepals; **Int. tep. ln.-** Length of the internal tepals; **Int. tep. wd.-** Width of the internal tepals; **Pub. ov.-** Pubescence of the ovary (0= glabrous, 1= pilose); **Pub. fl. tube-** Pubescence of the inner surface of the floral tube (0= glabrous, 1= pilose); **Out. ant. wd.-** Width of the anther of the outter stamens in relation to the filament (0= anther as wide as the filament, 1= anther wider than the filament); **Out. ant. op.-** position of the opening of the anther of the outer stamens (1= ventral, 2= ventral-lateral, 3= lateral); **Out. stm. con.-** Protuberance of the connective of the outer stamens (0= not protrunding, 1= protruding).

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Allen, C.K.	325	Aniba burchellii	27.14; 46.57; 34.92	3.52;3.05;3.36	1;0.88	0.55;0.56;0.76;	0.96;0.99;0.90	0.75;0.84;0.75	1	1	1	3	1
Allen, C.K.	326	Aniba burchellii	65.84; 44.87; 33.56	2.2	0.95	0.5	0.9	0.52	1	1	1	3	1
Berg, C.C.	P19463	Aniba burchellii	88.53; 75.73; 87.11	3.42	1.27	0.7	1.25	1.05	1	1	1	3	1
Coêlho, D.F.	s.n.	Aniba burchellii	111.51;80.30; 100	2.16	0.7	0.45	0.8	0.76	1	1	1	1;2;3	1
Cruz, E.D.	93	Aniba burchellii	45.39; 39.83; 32.67	2.37;2.64;2.63	0.62;0.57; 0.50;0.55; 0.52;0.60; 0.52	0.35;0.30;0.41;0.38;0.37;0.38;0.35	0.51;0.63;0.62;0.68;0.65;0.69;0.66;0.66;0.62	0.58;0.53;0.53;0.53;0.43;0.55;0.49;0.55;0.55	1	0	1	1	1
Ferreira, C.A.C.	652	Aniba burchellii	69.78; 102.10;49.17	2.87;3.59;3.15	0.76;0.77; 0.65;0.67; 0.78;0.73; 0.77;0.78	0.52;0.50;0.43;0.51;0.47;0.50;0.42	0.79;0.71;0.75;0.73;0.69;0.82;0.66;0.79	0.63;0.61;0.57;0.42;0.58;0.50;0.60	1	1	1	2	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Lleras, E.	P19590	Aniba burchellii	60;37.2;49.33	4.24;4.81;3.73	0.99;0.99;0.98;1.04;0.96;0.79;1.06	0.44;0.48;0.49;0.62;0.53;0.64;0.47	0.84;1;0.97;1.14;1.9;1.15;1.11;0.99	0.27;0.33;0.31;0.39;0.42;0.45;0.41;0.39	1	0	1	3	1
Mota, C.D.A. da	58	Aniba burchellii	133.22;107.11;62.06	3.57;3.28;3.45	0.88;0.81;0.75;0.76;0.76;0.73;0.74;0.78;0.68	0.64;0.52;0.50;0.52;0.54;0.47;0.54;0.64	0.90;0.73;0.81;0.69;0.61;0.72;0.701;0.71;0.59;0.66	0.62;0.70;0.48;0.68;0.64;0.43;0.42;0.43;0.68;0.56	1	1	0	1	0
Pessoal do C.P.F.	s.n.	Aniba burchellii	130;92.70;	2.72	0.79	0.61	0.63	0.46	0	1	1	3	1
Pires, M.J.P.	1842	Aniba burchellii	95.67;124.61;62.88	4.88;4.63;4.43	1.05;1.05;0.93;1.04;0.96;0.92;0.92;0.91	0.70;0.63;0.66;0.58;0.57;0.54;0.56;0.63	1.11;1.07;0.96;1.04;0.96;0.94;0.96;0.88;1.08	0.90;0.80;0.68;0.82;0.84;0.65;0.77;0.79;0.84	1	1	1	3	1
Pires, M.J.P.	2107	Aniba burchellii	81.67;108.03;45.58	5;4.52;5.04	1.17;1.25;1.19;1.10;1.03;1.07	0.94;0.87;0.96;0.93;0.89	1.28;1.11;1.20;1.11;0.94	1.19;0.97;1.29;0.84	1	1	1	3	1
Prance, G.T.	11677	Aniba burchellii	82;80.40;62.59	3.48;3.81;2.23	0.77;0.83;0.71;0.77;0.69;0.71;0.66	0.55;0.57;0.48;0.50;0.42;0.49;0.49;0.55	0.72;0.71;0.80;0.73	0.67;0.52;0.62	0	1	1	1	1
Prance, G.T.	13694	Aniba burchellii	54.13;27.03	4.29;3.31;3.86	1.29;1.27;1.42;1.12;1.23;1.32	0.89;0.97;1.01;1.18;0.99;0.93;1.06	1.38;1.24;1.25;1.12;1.12;1.25;1.19;1.18	0.67;0.77;0.78;0.82;1.06;0.80;0.82;0.88	1	1	1	1	1
Prance, G.T.	3185	Aniba burchellii	75;79.20;70.25	2.63	1.17	0.68	0.97	0.7	1	1	0	3	1
Prance, G.T.	3706	Aniba burchellii	74.5;74.60;75.18	2.68	1.2	0.54	1.15	0.58	1	0	1	3	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Prance, G.T.	3810	Aniba burchellii	39.33; 44.10; 34.20	3.74;3.40;4.39	0.80;0.79; 0.79;0.76; 0.80;0.87	0.57;0.51;0.54;0.46;0.44;0.51	0.86;0.73;0.68;0.80;0.79;0.77	0.66;0.70;0.54;0.68;0.60;0.68	1	0	1	3	1
Rios, C.A.G.	16178	Aniba burchellii	41.41; 42.46; 32.36	3.27;3.72;3.58	1.16;1.12; 1.11;0.80; 0.90;1.05; 0.80	0.68;0.58;0.48;0.49;0.45;0.44	1.19;1.10;1.05;0.89;1.05;0.93;0.98	1.02;0.89;0.85;0.59;0.75	1	1	1	3	1
Rodrigues, W.A.	1995	Aniba burchellii	75.12; 84.28; 81.91	4.16;3.85;3.59	0.94;0.92;1;0.91;0.83;0.98;0.81;0.93;0.88	0.53;0.75;0.64;0.59;0.57;0.59;0.64;0.47;0.56	0.79;1.02;0.91;0.96;0.85;0.83;0.76;0.79;0.82; 0.84	0.72;0.75;0.75;0.65;0.69;0.59	1	1	1	3	1
Rodrigues, W.A.	2835	Aniba burchellii	50.69; 43.98; 45.78	3.65;5.67;4.81	0.88;0.90; 0.87;1.03; 0.97;0.97; 0.95;0.93; 0.95	0.60;0.55;0.65;0.65;0.83;0.57;0.57	0.95;0.88;0.96;0.95;0.93;0.96;0.78;1.16;1.06	0.76;1.04;0.44;0.66;0.44;0.75;0.62;0.74	1	1	1	2;3	1
Rodrigues, W.A.	8626	Aniba burchellii	63.26; 44.19; 38.88	2.2	0.76	0.54	0.73	0.5	1	1	1	3	1
Sasaki, D.	183	Aniba burchellii	104.06;43.41; 73.02	1.99;2.41;1.97	0.85;0.79; 0.77;0.63; 0.80;0.76; 0.71;0.73; 0.78	0.26;0.34;0.30;0.30;0.25;0.28;0.40;0.46;0.40	0.79;0.69;0.81;0.73;0.71;0.79;0.76;0.75	0.38;0.45;0.28;0.31;0.42;0.39;0.37	0	0	0	1	1
Sothers, C.A.	286	Aniba burchellii	81.83; 127.50;117.64	6.37;6.94;7.01	0.94;0.98; 1.05;0.91; 0.95;0.89; 0.95;1.01; 0.97	0.50;0.51;0.50;0.45;0.48;0.44;0.43;0.43	1.04;0.98;1.07;1.08;0.97;0.97;1.02;0.94;1.05	0.86;0.78;0.72;0.87;0.73;0.69;0.66;0.75;0.66	1	1	1	3	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Wilde, L.	19-88	Aniba burchellii	69.45;88.64;60.10	5.49;5.21;6.46	0.91;0.93;0.83;0.87;0.94;1.02;0.77;0.69;0.80	0.59;0.48;0.60;0.55;0.52;0.68;0.52;0.55	0.68;0.98;0.89;1.02;0.72;0.87;0.94;0.84;0.76	0.69;0.71;0.79;0.60;0.70;0.68;0.74	1	1	1	3	1
Gensini, J.E.G.	19	Aniba coto	73.12	3.29;2.64;2.69	1.13;1.05;1.05;1.05;1.03;0.99;1.03;1.07;1.09	1.01;1.14;1.19;1.05;1.04;0.95;1.04;0.84;0.99	1.02;0.88;1.05;1.06;1.13;1;1.08;1.11;1.11	1.30;1.22;1.20;0.92;1.11;0.95;1.09;0.89;1.03	1	1	1	2;3	1
Palacios, W.A.	3716	Aniba coto	92.72;57.69;55.71	3.32;3.56;3.46	1.52;1.51;1.42;1.52;1.41;1.32;1.40;1.29;1.44	0.99;1.02;1.22;1.12;1.04;1.16;1.16;1.10;1.17	1.36;1.30;1.33;1.38;1.34;1.36;1.34;1.26;1.31	1.30;0.94;1.03;1.07;0.89;0.98;0.98;0.80;0.84	1	1	1	2	1
Palacios, W.A.	5087	Aniba coto	72.30;112.81;133.81	5.07;5.10;4.44	1.34;1.33;1.17;1.30;1.37;1.29;1.25;1.38;1.47	0.91;1.01;1.13;1.06;0.91;0.99;0.85;0.82;0.92	1.26;1.25;1.23;1.33;1.27;1.25;1.27;1.35;1.37	0.89;0.78;0.90;1.08;0.98;0.91;0.79;0.79;0.80	1	1	1	1	1
Palacios, W.A.	5093	Aniba coto	72.91;81.15;79.66	3.69;3.45;3.43	0.95;0.87;1.02;1.04;1.06;0.98;1.18;1.22	0.88;0.89;0.80;0.77;0.94;1.25;0.82;1.18	0.93;1.01;1.17;1.04;1.16;1.12;1.21;1.04	1.33;0.96;1.29;1.21;1.03;1.05;0.98;1.09	1	1	0	1	0
Suclli, E.	2549	Aniba coto	30.38	3.51;3.88;3.39	1.50;1.50;1.52;1.33;1.26;1.21;1.21;1.33	1.01;0.97;1.23;0.82;0.83;0.87;0.74;0.85	1.39;1.33;1.35;1.24;1.25;1.29;1.31;1.23;1.28	1.03;0.84;1.12;0.73;0.89;0.91;1.06;0.98;0.95	1	1	0	2	1
Clarke, H.D.	8561	Aniba cylindriflora	11.34;30.63;15.44	2.40;2;1.90	0.68;0.64;0.75;0.71;0.69;0.77;0.78	0.50;0.50;0.48;0.58;0.58;0.66;0.82	0.87;0.83;0.90;0.88;0.88;0.87;0.95;0.92	0.75;0.63;0.73;0.83;0.83;0.72;0.65;0.79	0	0	0	1;2	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Coêlho, D.F.	s.n.	Aniba cylindriflora	96.67; 53.55; 72.11	2.75;2.94;2.92	0.61;0.55; 0.49;0.54; 0.46;0.71; 0.66	0.36;0.32;0.29;0.33;0.32;0.27;0.33	0.83;0.77;0.59;0.57;0.56;0.68	0.43;0.41;0.43;0.37;0.37;0.39	0	0	1	1	1
Figlioulo, R.	Fit.134	Aniba cylindriflora	30.02; 25.68; 32.22	2.58;2.79;3.08	0.77;0.80; 0.83;0.75; 0.83;0.79; 0.71;0.76; 0.77;	0.43;0.37;0.46;0.37;0.42;0.34;0.36;0.40;0.46	0.83;0.86;0.88;0.90;0.90;0.90;0.77	0.43;0.47;0.55;0.52;0.52;	0	0	1	1	1
Killeen, T.J.	6944	Aniba cylindriflora	19.58; 16.48; 22.77	3.80;2.93;3.97	0.92;0.90; 0.97;0.98; 0.99;0.99	0.46;0.50;0.48;0.47	0.94;0.96;0.94;1.02;1.08;0.90	0.66;0.65;0.60;0.60;0.55	1	0	1	2	1
Kubitzki, K.	75-95	Aniba cylindriflora	36.86; 26.19	2.37;2.12;2.32	0.54;0.66; 0.56;0.68; 0.63;0.63; 0.69;0.64	0.27;0.35;0.32;0.25;0.26;0.39;0.26;0.33	0.76;0.72;0.81;0.69;0.71;0.72;0.71;0.62;0.69	0.44;0.40;0.36;0.28;0.30;0.26;0.28;0.31;0.44	0	0	1	1	1
Kubitzki, K.	79-64	Aniba cylindriflora	27.4;26.33;29.82	2.9	0.74	0.47	0.68	0.37	0	0	1	2	1
Lewis, M.	37644	Aniba cylindriflora	34.06; 37.46; 36.56	2.55;3.08;2.62	1.12;1.13; 1.16;1.22; 1.13;1.13; 1.08;1.13; 1.05;1.08	0.41;0.44;0.45;0.54;0.43;0.48;0.42;0.40;0.46; 0.46	1.12;1.20;1.16;0.91;1.02;0.95;0.95;0.93;0.93; 0.95	0.61;0.50;0.58;0.42;0.44;0.53;0.51;0.52	1	0	0	1	1
Lima, L. de	273	Aniba cylindriflora	102.7; 57.39	2.45;2.49;2.70	0.81;0.78; 0.84;0.73; 0.67;0.81; 0.81;0.77; 0.82	0.49;0.52;0.39;0.41;0.41;0.43;0.53;0.53	0.73;0.71;0.71;0.74;0.77;0.76;0.64;0.81	0.48;0.43;0.51;0.47;0.61;0.43	1	1	1	1	0
McDaniel, S.T.	16297	Aniba cylindriflora	103.20;121.8	3.39;3.05;3.29	0.90;0.99; 0.91;0.90; 0.94;1.05;	0.50;0.57;0.53;0.53;0.5	0.90;0.90;0.87;0.89;0.8	0.65;0.65;0.59;0.49;0.60	0	0	1	1	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
			0;186.62		0.82;0.86;0.75	2;0.52;0.59;0.60;0.64	5;0.90;0.93;0.88;0.91						
Nee, M.H.	38661	Aniba cylindriflora	47.62;52.55;58.81	3.04;2.75;3.40	0.80;0.96;1.03;0.79;0.92;0.86;0.84;0.83	0.60;0.78;0.45;0.54;0.60	1.06;0.99;0.62;0.86;0.87;0.96;0.87;0.93;0.86	0.62;0.63;0.47;0.55;0.60;0.58;0.47;0.64	1	0	1	1;2	1
Nee, M.H.	38678	Aniba cylindriflora	59.37;48.12;43.77	3.50;3.32;3.75	0.96;1.06;0.97;0.86;0.89;1.10;0.93;0.91;0.85	0.47;0.50;0.56;0.44;0.55;0.41;0.44;0.46	1.22;1.27;1.05;1.02;1.03;1.07;1.20;1.13;1.03	0.74;0.76;0.79;0.55;0.64;0.52;0.70;0.70;0.56	1	1	1	1	1
Nee, M.H.	38707	Aniba cylindriflora	36.50;24.78	2.93;2.41;2.59	0.72;0.74;0.75;0.87;0.84;0.68;0.84;0.87;0.83	0.43;0.55;0.48;0.49;0.43;0.62;0.54;0.53;0.56	0.93;0.92;1;0.80;0.96;0.90;0.97;0.98;0.93	0.63;0.51;0.68;0.56;0.52;0.75;0.68;0.71	1	0	0	1	1
Nee, M.H.	38774	Aniba cylindriflora	49.64;26.05;40.34	3.19;2.94;2.67	0.92;0.97;0.89;0.94;0.89;0.88;0.93;0.83;0.92	0.47;0.42;0.58;0.45;0.51;0.53;0.60	1.20;1.13;0.97;0.87;0.82;0.83;0.84;0.81;0.83	0.69;0.72;0.58;0.62	1	0	0	1;2	1
Pires, O.	286	Aniba cylindriflora	20.37;14.86	2.72	0.75	0.4	0.71	0.31	0	0	1	1	1
Prance, G.T.	14986	Aniba cylindriflora	40.26;33.59;24.31	2.05	0.65	0.35	0.73	0.42	0	1	1	1	1
Prance, G.T.	6970	Aniba cylindriflora	22.60;30.21	1.86;2.15;1.94	0.69;0.70;0.67;0.59;0.69	0.40;0.46;0.44;0.48	0.59;0.46;0.58;0.70;0.64	0.43;0.49;0.43;0.48;0.52	0	0	1	1	0
Vásquez, R.	17604	Aniba cylindriflora	25.43	4.54;3.76;3.58	0.81;0.82;0.77;0.72;	0.54;0.49;0.46;0.46;0.52;0.47;0.45	0.94;1.01;0.92;0.82;0.9	0.71;0.79;0.77;0.71;0.7	1	0	0;1	1	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
					0.78;0.68; 0.74;0.66		4;0.95;1.05 ;0.95	1;0.79;0.79 ;0.85					
Vásquez, R.	5283	Aniba cylindriflora	82.31; 71.51	2.49;2. 70	0.73;0.66; 0.66	0.36;0.27;0. 37	0.71;0.71;0. 74	0.41;0.47	0	0	0	1	0
Vásquez, R.	5372	Aniba cylindriflora	58.12; 108.36 ;60.55	3.19;3. 13;3.2 9	0.97;0.99; 1.01;1.02; 1.04;0.95; 0.93;1.07	0.50;0.44;0. 53;0.57;0.6 9;0.59;0.55 ;0.42	1.05;1.02;0. 96;0.95;0.9 5;1.01;0.91 ;0.98;0.91	0.61;0.65;0. 54;0.72;0.7 0;0.62;0.67	1	0	1	1	1
Vásquez, R.	5516	Aniba cylindriflora	69.48; 72.62; 37.79	3.08;3. 12;3.3 8	0.87;0.86; 0.84;0.74; 0.75;0.91; 0.82;0.84; 0.84	0.51;0.54;0. 47;0.50;0.5 2;0.48;0.52 ;0.46;0.50	0.73;0.76;0. 81;0.75;0.8 1;0.78;0.83 ;0.78;0.77	0.47;0.38;0. 45;0.47;0.4 7;0.49;0.48 ;0.49;0.48	0	0	1	1	0
Hatschbach, G.G.	27987	Aniba firmula	24.91; 25.38; 26.61	4.86;4. 11;3.8 4	1.44;1.40; 1.32;1.53; 1.46;1.38; 1.38	1.05;1.02;1. 14;1.09;0.8 5;1.08;0.98	1.21;1.14;1. 30;1.27;1.4 4;1.19;1.27 ;1.39;1.27	0.81;0.94;1. 05;1.31;1.1 0;1.13;1.04 ;1.20;0.97	1	1	0	1;2	1
Hatschbach, G.G.	41945	Aniba firmula	21.12; 16.21	4.83;5. 91;5.8 7	1.34;1.29; 1.30;1.30; 1.31;1.27; 1.39;1.34	0.89;0.80;0. 79;0.76;0.7 0;0.78;0.84 ;0.77	1.33;1.29;1. 39;1.33;1.3 0;1.23;1.40 ;1.31	1.15;1.15;0. 94;0.82;0.8 7;1.25;1.09 ;1.18	1	1	0	1	1
Kuhlmann, J.G.	6603	Aniba firmula	81.55; 91.94; 112.95	3.54;4. 18;3.4 1	1.28;1.24; 1.13;1.26; 1.08;1.15; 0.99;0.91; 1.19	0.88;0.78;0. 93;0.86;0.6 4;0.54;0.50 ;0.63	1.31;1.14;1. 12;1.26;1.0 7;1.09;1.15 ;1.12	0.80;0.72;0. 73;0.92;0.6 6;0.64;0.65 ;0.61	1	1	0	2	1
Oliveira, R.P. de	328	Aniba firmula	60.68; 57.56; 71.93	3.90;4. 08;4.2 9	1.15;1.24; 1.17;1.15; 1.24;1.25; 1.24;1.30	0.76;0.76;0. 87;0.66;0.6 1;0.70;0.78	1.24;1.17;1. 16;1.21;1.1 5;1.28;1.12 ;1.08;1.22	0.90;0.85;0. 86;0.84;0.6 6;0.86	1	1	0	2;3	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Silva, O.A.	s.n.	Aniba firmula	50.74; 33.05	2.78;4.17;3.17	1.31;1.39; 1.35;1.05; 1.10;1.14; 1.10;1.01; 1.13	1.36;1.34;1.27;0.74;0.62;0.80;0.67;0.77	1.28;1.21;1.04;1.14;1.04;1.06;1.08;1.12	1.04;0.98;0.86;0.69;0.74;0.77	1	1	0	1	1
Harley, R.M.	53459	Aniba heringeri	249.93;249.60	5.54;5.46;4.89	1.82;1.70; 1.70;2.01; 1.86;1.64; 1.66;1.81	1.58;1.68;1.55;1.38;1.66;1.59;1.37	1.77;1.36;1.41;1.58;1.60;1.65;1.78	1.43;1.47;1.56;1.57;1.24;1.60;1.48	1	1	0	2	1
Lombardi, J.A.	3535	Aniba heringeri	33.79; 22.26; 38.35	3.54;3.59;3.65	1.23;1.20; 1.14;1.24; 1.37;1.17; 1.05;1.11; 1.05	0.93;0.93;1.09;1.01;	1.23;1.18;1.22;1.25;1.03;1.03;1.14;1.12;1.32	1;1.04;1.07;0.86;0.94	1	1	0	2	1
Lombardi, J.A.	4098	Aniba heringeri	33.21; 30.32; 41.15	4.04;4.30;3.84	1.64;1.63; 1.54;1.41; 1.42;1.45; 1.49;1.48; 1.40	1.06;1.11;1.10;1.07;0.89;1.08;1.02;0.87	1.39;1.36;1.41;1.16;1.23;1.15;1.32;1.32	1.30;1.19;1.35;0.88;0.97;1	1	1	0	1	1
Ramos, P.C.M.	213	Aniba heringeri	61.73; 31.36; 52.74	4.51;4.75;4.13	1.96;1.85; 2;1.87;1.90;1.93;1.70;1.67;1.97	1.33;1.07;1.31;1.28;1.23;1.32;1.25	1.82;1.57;1.67;1.77;1.62;1.69;1.63	1.16;1.16;1.20;1.34;1.30;0.99;1.36	1	1	0	3	1
Stehman, J.R.	2690	Aniba heringeri	20.13; 16.67; 23.78	4.23;4.03;3.81	1.28;1.29; 1.23;1.38; 1.19;1.22; 1.18;1.25; 1.20	1.37;1.17;1.21;1.10;1.05;1.01;1.17;1.09;1.17	1.25;1.21;1.23;1.16;1.21;1.16;1.19;1.16;1.18	1.07;1.27;1.33;0.92;0.91;0.96;0.87;1.15;1.01	1	1	0	1	1
Vásquez, R.	6752	Aniba heterotepala	84.14; 79.46; 92.55	5.53;4.68;4.27	1.14;1.11; 1.08;1.23; 1.14;1.07;	1.10;1.01;0.89;0.67;0.9	1.63;1.45;1.61;1.61;1.5	1.36;1.29;1.48;1.17;1.2	0	0	1	1	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
					1.11;1.01;0.89	1;0.83;0.78;0.88	4;1.19;1.67;1.30;1.46	7;1.02;1.19;1.32;1.20					
Cornejo, M.	1427	Aniba muca	89.95	3.60;3.90;3.42	0.96;0.89;0.84;0.92;0.95	0.54;0.70;0.63;0.62;0.62	0.94;0.95;0.85;0.85;0.78	0.65;0.63;0.60;0.70;0.66	1	1	1	1;3	1
Palacios, W.A.	13292	Aniba muca	35.80;23.43;25.47	3.58;4.06;4.17	0.71;0.79;0.73;0.61;0.67;0.57;0.67;0.62;0.64	0.47;0.48;0.57;0.54;0.46;0.47;0.48;0.44;0.47	0.65;0.57;0.56;0.58;0.60;0.69;0.74;0.64	0.39;0.44;0.48;0.46;0.45;0.42;0.45	1	0	1	2	1
Smith, D.N.	4613	Aniba muca	23.13;25;17.92	5.19;4.46;4.83	1.07;1.09;1.09;1.03;0.96;1.08;1.05;1.03;1.02	0.62;0.66;0.79;0.71;0.72;0.69;0.65;0.70;0.69	1.22;1.24;1.21;1.15;1.15;1.13;1.12;0.96;1.06	0.97;0.92;1.09;0.90;0.73;0.88;0.70;0.90;0.77	1	1	1	1	1
Smith, D.N.	4718	Aniba muca	56;37.84	3.80;4.37;4.33	1.09;1.02;1.04;0.97;1;1.06	0.65;0.75;0.69;0.68;0.72;0.61	1.15;1.18;1.11;1.06;1.02;0.97	1.10;0.81;0.77;0.64;0.71	1	1	1	2	1
Vargas, W.G.	3349	Aniba muca	62.83;86.12;68.03	5.34;4.74;5.58	1.31;1.43;1.30;1.24;1.22;1.19;1.27;1.31;	1.24;1.32;1.04;0.77;1.03;1.07;1.11	1.40;1.32;1.28;1.19;1.19;1.30;1.26;1.22;1.17	0.99;1.03;1.15;0.97;1.03;1.05	1	1	0	1;2	1
Aluizio, J.	112	Aniba panurensis	65.54;51;46.14	3.42;4.46;3.30	1.07;1.02;1.03;0.99;0.94;0.99;0.96	0.77;0.69;0.75;0.65;0.75;0.67;0.65	1.20;1.06;0.95;0.94;0.93;0.81;0.84;0.75	0.96;0.94;0.51;0.63;0.62;0.58;0.67;0.55	1	1	1	1	1
Aluizio, J.	124	Aniba panurensis		5.79;7.56;7.25	1.20;1.26;1.28;1.21;1.27;1.27;1.13;1.21;1.23	0.62;0.64;0.52;0.61;0.61;0.66;0.55;0.54;0.50	1.21;1.26;1.33;1.30;1.11;1.23;1.06;1.17;1.15	0.59;0.59;0.62;0.81;0.63;0.69	1	1	0	2	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Aluizio, J.	81	Aniba panurensis	119.20;153;140.59	3.66;4.47;4.73	1.07;1.15;1.06;1.09;1.09;1.16;1.11;1.11;1.21	0.82;0.65;0.81;0.75;0.70;0.81;0.72;0.77;0.72	1.30;1.23;1.17;1.06;0.97;1.07;1.13;1.13;1.30	0.84;0.96;1.15;0.99;0.83;0.93;1.08	1	1	0	1	1
Aluizio, J.	89	Aniba panurensis		2.8	0.70;0.76	0.51;0.47	0.95;0.96;0.90;0.80;0.75	0.60;0.60;0.65;0.52;0.43	1	1	1	1	1
Aymard, G.	7930	Aniba panurensis	47.87;36.48;34.63	3.74;4.40;3.14	0.93;0.99;0.94;1.01;0.94;0.92;0.92;0.93;1.06	0.55;0.50;0.55;0.69;0.60;0.61;0.70;0.58;0.57	0.83;0.87;0.88;0.77;0.82;0.86;0.87;0.83	0.66;0.54;0.59;0.57;0.67;0.68;0.58;0.75	1	1	0	1	1
Beck, H.T.	150	Aniba panurensis	40.38;33.53	3.35;3.42	0.60;0.84;0.83;0.59;0.60;0.63	0.43;0.53;0.57;0.48;0.60;0.61	0.93;0.94;0.84;0.92;0.84;0.79	0.72;0.54;0.65;0.53;0.59;0.65	1	1	1	1	1
Boerboom, J.	9604	Aniba panurensis	95.1;92.19;67.51	4.21;4.30;4.18	1;1.08;0.92;0.98;0.92;0.93;0.90;1.02;1.04	0.94;0.80;0.74;0.94;0.75;0.84;0.87;0.68;0.83	1.04;1.32;1.20;1.05;1.01;1.15;0.96;1.20;1.11	1.35;1.03;1.11;1.09;0.96;1.15;1.05;0.95;1.28	1	1	1	1	1
Carnevali, G.	1525	Aniba panurensis	27.22;29;32.11	1.96;3.29;3	0.76;0.75;0.72;0.72;0.72;0.73;0.73;0.65	0.43;0.51;0.50;0.35;0.38;0.38;0.37;0.38	0.70;0.71;0.76;0.64;0.68;0.59;0.68;0.60;0.69	0.47;0.51;0.50;0.46;0.43;0.45;0.43;0.34;0.52	0	0	0	1	1
Castañeda, A.J.P.	4952	Aniba panurensis	43.22;42.05;54.29	3.74;3.37;3.70	0.72;0.79;0.74;0.85;0.83;0.83;0.77;0.76;0.61	0.62;0.61;0.63;0.61;0.60;0.61;0.61;0.61;0.60	0.63;0.58;0.76;0.68;0.72;0.76;0.75;0.80	0.52;0.55;0.53;0.55;0.57;0.63	1	1	1	1	0

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Coêlho, D.F.	s.n.	Aniba panurensis	65.78; 62.85; 71.71	2.8	0.74	0.47	0.86	0.57	1	0	1	1	1
Coêlho, D.F.	s.n.	Aniba panurensis	83.6	3.02;3.78;3.57	0.76;0.71; 0.80;0.82; 0.69	0.38;0.47;0.49;0.46;0.54	0.85;0.54;0.88;0.80	0.56;0.45;0.60;0.59	1	1	1	1	1
Coêlho, D.F.	s.n.	Aniba panurensis	81.2	3.87	1.13	0.87	0.95	0.85	1	1	1	3	1
Croat, T.B.	19724	Aniba panurensis	55.62; 64.31	2.70;3.28;2.91	0.85;0.91; 0.84;0.91; 0.91;0.66; 0.75;0.72	0.55;0.60;0.67;0.47;0.53;0.51	0.80;0.81;1.03;0.86;0.82;0.83;0.65;0.67;0.73	0.42;0.47;0.65;0.49;0.47;0.56;0.55;0.49	0	0	1	1;2	1
Daly, D.C.	1459	Aniba panurensis	41.79; 43.58; 79.03	3.19;4.43;2.73	0.77;0.94; 0.91;0.94; 0.74;0.87; 0.68;0.94; 0.92	0.35;0.36;0.46;0.39;0.31;0.43;0.50;0.45;0.55	0.78;0.78;0.85;0.79;0.68;0.75;0.61;0.78;0.74	0.34;0.43;0.40;0.36;0.36;0.41;0.35;0.42;0.36	1	1	0	1	1
Davidse, G.	13562	Aniba panurensis	40.87; 24.51; 21.81	2.92;2.31;2.89	0.87;0.87; 0.84;0.89; 0.82;0.72; 0.83;0.86; 0.88	0.69;0.55;0.48;0.60;0.60;0.51;0.49;0.54;0.45	0.91;0.91;0.80;0.80;0.71;0.78;0.82;0.68;0.72	0.57;0.50;0.52;0.43;0.49;0.46;0.47;0.49;0.52	0	0	1	1	1
Davidse, G.	13713	Aniba panurensis	57.54; 50.57; 60.90	3.52;2.95;2.99	0.89;0.95; 1.04;1.01; 0.94;0.84; 0.85;0.86	0.44;0.54;0.54;0.46;0.44;0.44;0.48;0.44	0.85;0.83;0.88;0.81;0.85;0.82;0.77;0.89;0.93	0.57;0.46;0.43;0.42;0.39;0.42;0.35;0.38;0.40	1	1	0	2;3	1
Ferreira, C.A.C.	3128	Aniba panurensis	36.46; 30	2.09;2.82;2.46	0.82;0.69; 0.77;0.76; 0.73;0.77; 0.79;0.76; 0.68	0.56;0.51;0.52;0.45;0.51;0.51;0.51;0.52;0.48	0.72;0.77;0.73;0.84;0.75;0.70;0.71;0.79;0.73; 0.70	0.40;0.39;0.46;0.35;0.35;0.40;0.44;0.42;0.43	1	1	1	3	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Ferreira, C.A.C.	7952	Aniba panurensis	97.58; 119.81 ;91.84	3.85;4.49;3.66	0.70;0.78; 0.77;0.75; 0.89;0.87; 0.90;0.71	0.37;0.52;0.80;0.61;0.47;0.48;0.58	1.01;0.89;0.89;0.95;0.78;0.92;0.83 ;0.97;0.97	0.83;0.79;0.76;0.74;0.53;0.86;0.71 ;0.59;0.87	1	1	1	1	0
Fuentes, A.F.	3706	Aniba panurensis	29.37; 28.73; 19.66	2.86;2.54;2.66	0.79;0.86; 0.84;0.99; 0.79;0.55; 0.69;0.67	0.56;0.61;0.76;0.73;0.61;0.49;0.53 ;0.53	0.96;0.98;1.07;0.97;0.90;1.06;0.93 ;0.89	0.88;0.90;1.04;0.77;0.79;0.75;0.72 ;0.77	1	1	0	2	0
Gaui	200	Aniba panurensis	65.15; 49.47; 73.54	4.88;4.72;4.41	0.97;1.06; 1.02;1.21; 1.18;1.26; 1.23;1.07; 1.03	0.57;0.47;0.60;0.67;0.60;0.44;0.47 ;0.49	1.10;1.09;1.10;1.25;1.09;0.96;1.05 ;1.01;0.99	0.48;0.66;0.65;0.58;0.45;0.62;0.59 ;0.49;0.72	1	1	0	2	1
Hartshorn , G.S.	2944	Aniba panurensis	47.63; 41.48; 53.56	2.51;3.28;3	0.96;1.02; 1.11;1.13; 0.95;1.05; 1.06	0.66;0.50;0.55;0.53;0.63;0.62;0.72	1.11;1.03;1.08;1.06;0.96;1.04;0.95 ;1.10;1.01	0.85;0.67;0.80;0.70;0.74;0.66;0.70 ;0.79	1	0	0	3	1
Huashikat , V.	1030	Aniba panurensis	87.75; 64.76; 45.78	3.40;2.91;3.38	0.83;0.73; 0.79;0.79; 0.75;0.80; 0.63;0.77; 0.69	0.45;0.40;0.40;0.41;0.40;0.39;0.47 ;0.33;0.49	0.81;0.86;0.79;0.78;0.77;0.71;0.84 ;0.84;0.82	0.39;0.46;0.36;0.43;0.40;0.54;0.56 ;0.48	1	1	0	1	1
Huashikat , V.	732	Aniba panurensis		7.22;7.86;9.65	1.03;1.15; 1.18;1.04; 0.90;1.03; 1.03	0.75;0.70;0.82;0.71;0.74;0.62;0.75	1.09;0.97;1.17;1.11;0.84;0.92;0.95 ;1.05;1.07	0.84;0.71;0.64;0.75;0.69;0.65	1	1	0	1	1
Korning, J.	8594	Aniba panurensis	53.84; 42.28	4.33;3.58;3.25	0.86;0.86; 0.76;0.71; 0.81;0.81; 0.84;0.87; 0.80	0.58;0.70;0.47;0.39;0.43;0.55;0.49 ;0.50	0.78;0.59;0.76;0.81;0.76;0.76;0.82 ;0.80;0.73	0.60;0.46;0.59;0.56;0.42;0.60;0.60 ;0.53	1	1	0	1	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Kurz, H.	32	Aniba panurensis	47;46.67;38.52	2.53	0.96	0.7	0.74	0.61	1	0	1	1	1
Loureiro, A.A.	s.n.	Aniba panurensis	34.22;26.97;32.10	2.7	1	0.6	0.88	0.6	1	1	0	2	1
Maia, L.A.	568	Aniba panurensis	71;87.30;69.58	2.75;2.93;3.53	1.12;1.14;0.95;0.92;1.01;1;0.93;0.99;0.98	0.66;0.48;0.60;0.58;0.45;0.62;0.61;0.60	0.97;0.99;1.06;1.10;1.11;0.89;0.99	0.54;0.76;0.53;0.69;0.74;0.56	1	0	1	1;2	1
Meza, F.G.	4600	Aniba panurensis	49.06;51.35;38.21	4.12;4.21;4.10	0.87;0.95;0.84;0.93;0.74;0.76;0.73;0.92	0.52;0.64;0.67;0.49;0.39;0.61;0.49	0.89;0.77;0.85;0.89;0.83;0.80;0.83;0.77;0.77	0.51;0.65;0.70;0.56;0.44;0.53;0.69;0.48;0.48	1	0	0	1	1
Monteagudo, A.	12533	Aniba panurensis	97.08	3.44;4.10;3.72	1.34;1.38;1.38;1.22;1.21;1.36;1.22;1.24;1.24	1;0.95;0.70;0.75;0.67;0.83;0.65	1.21;1.34;1.31;1.22;1.11;1.10;1.23;1.18;1.18	0.89;0.98;1.01;0.68;0.80;0.92	1	1	0	1	1
Monteagudo, A.	12568	Aniba panurensis	39.88;26.72;27.44	4.50;2.28;3.41	1.11;0.92;1.03;0.91;0.93;0.85;0.97;0.97;0.92	0.83;0.76;0.76;0.63;0.57;0.63;0.65;0.61;0.60	1.08;1.02;1.13;0.84;0.84;0.92;0.91;0.96;0.88	0.87;0.79;0.95;0.56;0.60;0.65;0.66;0.71	1	1	1	1	0
Monteagudo, A.	12575	Aniba panurensis	14.36;18.59;14.72	2.80;2.43;2.43	0.81;0.80;0.85;0.80;0.81;0.76;0.77;0.84;0.79	0.67;0.71;0.80;0.79;0.78;0.68;0.64;0.64;0.65	0.89;1.07;1;0.91;0.86;0.91;0.97;1.05;1.01	0.96;0.80;0.93;0.97;0.80;1.04;0.77	1	0	0	1	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Nascimento, J.R. do	s.n.	Aniba panurensis	68.63; 53.49; 71.63	5.41;4.49;3.89	1.04;1.13; 0.96;0.86; 0.79;1.02; 0.93;0.98	0.56;0.49;0.59;0.41;0.51;0.50;0.56	0.95;0.81;0.85;0.82;0.88;0.93;0.87	0.48;0.44;0.48;0.54;0.40;0.51;0.47	1	1	0	1;2	1
Oliveira, A.C.A.	313	Aniba panurensis	72.77; 113.69	2.37	0.66;0.63; 0.63	0.37;0.47;0.40	0.80;0.91;1	0.45;0.64;0.57	1	1	1	1	1
Pires, O.	54	Aniba panurensis	57.94; 99.67; 95.29	4;4.79; 4.68	1.02;0.95; 0.93;0.94; 0.95;0.82; 0.81;0.89; 0.88	0.75;0.61;0.81;0.77;0.69;0.63;0.66;0.64;0.61	0.99;0.95;0.90;0.89;0.95;0.94;0.89;0.84;0.86	1.10;0.89;0.91;0.80;0.59;0.81;0.74;0.78	1	1	1	1	1
Prance, G.T.	16049	Aniba panurensis	65.59; 41.67	3.26;2.52;2.57	0.79;0.88; 0.94;0.72; 0.69;0.76	0.58;0.52;0.42;0.51;0.36;0.35	0.93;1.15;1.07;0.74;0.83	0.82;0.89;0.81;0.67	1	1	0	1;3	1
Prance, G.T.	2114	Aniba panurensis	75.88; 55.72; 59.56	2.4	0.97	0.65	1	0.5	1	1	1	1	1
Prance, G.T.	2124	Aniba panurensis	91.54; 101.78;64.08	3.42;2.77;3	0.85;0.85; 0.80;0.73; 0.83;0.59	0.39;0.33;0.34	0.71;0.91;0.84;0.83;0.77;0.76	0.66;0.52;0.56;0.56	1	1	0;1	1;3	1
Prance, G.T.	2162	Aniba panurensis	85.3;122.65	2.7	1.12	0.7	1	0.54	1	0	1	2	1
Prance, G.T.	2176	Aniba panurensis	72;59.37;84.34	2.52	0.92	0.54	1.23	0.5	1	1	1	1	1
Prance, G.T.	2658	Aniba panurensis	169.69;177;124.70	2.74	1.03	0.76	1.06	0.6	1	1	1	1	1
Prance, G.T.	2693	Aniba panurensis	112.3	5.1	1.07	0.8	0.98	0.77	1	0	0	2	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Prance, G.T.	5363	Aniba panurensis		2.88;2.76;2.83	0.76;0.78;0.77;0.72;0.61;0.71;0.75;0.67	0.49;0.42;0.44;0.38;0.42;0.39;0.39;0.40	0.77;0.74;0.92;0.74;0.82;0.75;0.73;0.66;0.74	0.57;0.61;0.92;0.43;0.54;0.61;0.52;0.27	1	1	0	1	1
Ramos, J.F.	1162	Aniba panurensis	18.32;16.95;21.98	2.50;2.81;3	0.82;0.72;0.81;0.85;0.85;0.76;0.88;0.82;0.81	0.62;0.56;0.67;0.59;0.64;0.48;0.55	1.03;0.93;0.83;0.65;0.88;0.85;0.72;0.63;0.63	0.65;0.68;0.73;0.57;0.42;0.47;0.48;0.50	1	1	0	1	1
Ramos, J.F.	1582	Aniba panurensis	53.35;60;40.37	4.28;3.99;5.68	0.91;0.89;0.97;0.81;0.73;0.79;0.78;0.73;0.70	0.62;0.45;0.52;0.59;0.55;0.61;0.55;0.52;0.57	0.68;0.82;0.72;0.75;0.69;0.78;0.74;0.77	0.56;0.44;0.65;0.55;0.38;0.52;0.66;0.52;0.60	1	1	1	1	1
Ramos, J.F.	1857	Aniba panurensis	122.76;97.32	3.18;2.68;2.84	0.87;0.83;0.83;0.74;0.84;0.79;0.77;0.65	0.75;0.68;0.76;0.78;0.77;0.69;0.64;0.66	0.73;0.77;0.82;0.79;0.74;0.80;0.76	0.59;0.67;0.65;0.66;0.53;0.63;0.60	1	1	0	1	1
Revilla, J.	8435	Aniba panurensis	46.36	3.81;3.50;3.94	0.84;0.83;0.87;0.84;0.89;0.81;0.84	0.38;0.51;0.35;0.45;0.39;0.32	0.74;0.77;0.74;0.91;0.85;0.79;0.82;0.75;0.72	0.51;0.44;0.58;0.46;0.34;0.41;0.53;0.42	1	1	0	1	1
Reynel, C.	603	Aniba panurensis	55.74;68.58;51.97	3.48;3.51;3.24	0.91;0.77;0.92;0.91;0.88;0.76;0.82;0.77;0.89	0.58;0.56;0.61;0.65;0.51;0.62;0.54;0.58;0.55	0.80;0.76;0.89;0.85;0.87;0.74;0.77	0.57;0.51;0.51;0.55;0.62;0.53;0.52	1	1	0	1	1
Rimachi, M.	10682	Aniba panurensis	51.78;54.26;50.68	3.20;2.92;2.68	0.84;0.92;0.83;0.88;0.78;0.83;0.79;0.80	0.40;0.39;0.46;0.42;0.46;0.32;0.38;0.38	0.86;0.96;0.81;0.90;0.67;0.81;0.81;0.77	0.44;0.51;0.53;0.45;0.40;0.50;0.42;0.43	0	0	1	2	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Rimachi, M.	1795	Aniba panurensis	46.93;26.49	2.75;2.56;2.57	0.92;0.84;0.84;0.83;0.85;0.89;0.93;0.86;0.96	0.39;0.47;0.47;0.46;0.36;0.33;0.48;0.36;0.42	0.83;0.73;0.71;0.79;0.87;0.90;0.84;0.90	0.57;0.55;0.46;0.42;0.61;0.49	0	0	1	1	1
Rodrigues, W.A.	5325	Aniba panurensis	105;85.16;90.27	4	1	0.7	1	0.9	1	1	1	1	1
Rodrigues, W.A.	5414	Aniba panurensis	136.38;127.18;155.28	3.18	0.9	0.95	1.11	1.15	1	1	1	1	1
Rodrigues, W.A.	5951	Aniba panurensis	140.83;69.06;124.23	3.47;3.17;3.63	1.14;1.11;1.06;1.06;0.97;0.94;1.12;0.97	0.55;0.63;0.67;0.81;0.58;0.81;0.57;0.50	1.05;1.07;1.15;1.02;1.12;0.92;1.04;0.95	0.75;0.75;0.70;0.67;0.97;0.94;0.88	1	1	1	1	1
Rodrigues, W.A.	5969	Aniba panurensis	94.31;101.21	3.34;3.58	1.04;1.02;1.20	0.74;0.51	0.97;1.05;1.06;0.97	0.52;0.46;0.55	1	1	0;1	1;3	1
Rodrigues, W.A.	5976	Aniba panurensis	92.6;69.95;66.80	2.74	1	0.57	1.04	0.52	1	1	1	1	1
Rodrigues, W.A.	5996	Aniba panurensis	111.5	3.18;3.86;3.89	1.03;0.91;0.89;0.86;0.93;0.82;0.95;0.96;1.02	0.84;0.63;0.69;0.60;0.66;0.68;0.61;0.76	0.99;0.86;0.88;0.93;0.89;0.91;0.95	0.79;0.65;0.63;0.80;0.72;0.76	1	1	0	1	1
Rodrigues, W.A.	5997	Aniba panurensis	82.17;49.66;99.35	3;3.19;5.13	0.95;0.87;0.77;0.97;0.92;1.02;0.96;0.86	0.51;0.51;0.48;0.49;0.59	0.82;0.85;0.87;0.86;0.81;0.86	0.62;0.49;0.59;0.68;0.52;0.56	1	1	1	1	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Rodrigues, W.A.	6729	Aniba panurensis	83.59; 50.84; 58.93	2.49;2.69;2.79	0.60;0.70; 0.70;0.70; 0.68;0.70; 0.76;0.75	0.25;0.25;0.36;0.35;0.31;0.32;0.27	0.68;0.85;0.85;0.85;0.77;0.70	0.54;0.51;0.54;0.58;0.66;0.67	1	0	1	1;2	1
Rodrigues, W.A.	6742	Aniba panurensis	78.52; 88.22; 82.62	4.08;3.74;4.81	0.74;0.73; 0.66;0.85; 0.75;0.70; 0.63	0.33;0.34;0.35;0.32;0.30;0.37;0.34	0.83;0.78;0.85;0.72;0.76;0.89;0.77;0.85	0.60;0.53;0.65;0.44;0.44;0.59;0.58;0.65	1	0	1	1	1
Rodrigues, W.A.	7899	Aniba panurensis	45.08; 58.73; 50.19	5.78;4.71;4.54	1.13;1.22; 1.42;1.36; 1.42;1.28; 1.29;1.36	0.54;0.46;0.77;0.59;0.62;0.48;0.42;0.52	1.14;1.32;1.23;1.65;1.38;1.28;1.19	0.41;0.57;0.48;0.65;0.48;0.52;0.40	1	1	1	1	1
Rodrigues, W.A.	8208	Aniba panurensis	204.76;106.29;131.89	3.79;3.70;3.91	0.96;0.86; 0.74;0.91; 0.71;0.93; 0.83;0.79; 0.77	0.57;0.50;0.89;0.59;0.64;0.62;0.73;0.55;0.63	0.83;0.87;0.98;0.84;0.83;1.12;0.79;0.70;0.77	0.59;0.58;0.67;0.73	1	1	1	1	1
Rodrigues, W.A.	8221	Aniba panurensis	141.54;125.20;112.72	4.1	1.34	0.75	1.15	0.72	1	1	1	1	1
Rodrigues, W.A.	8926	Aniba panurensis	80.25	3.33	0.98	0.68	0.93	0.63	1	0	0	1	1
Silva, M.F. da	365	Aniba panurensis	80.93; 85.64; 103.80	4.09;4.86;3.64	0.64;0.62; 0.92;0.67; 0.86;0.80; 0.76	0.51;0.46;0.41;0.43;0.50;0.55;0.46	0.90;0.88;0.90;0.93;0.77;0.77;0.82;0.90	0.58;0.61;0.65;0.50;0.50;0.54;0.64;0.64	1	1	0	1	1
Smith, S.F.	1364	Aniba panurensis	50.36; 44.70; 57.63	2.54;2.89;2.73	1.01;0.80; 0.81;0.89; 0.84;0.85; 0.87;0.88; 0.96	0.51;0.53;0.43;0.41;0.42;0.46;0.49;0.60	0.77;0.82;0.87;0.84;0.84;0.89;0.81;0.87;0.76	0.64;0.61;0.65;0.70;0.48;0.59;0.57;0.58;0.51	1	1	0	1	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Wayt, T.	4803	Aniba panurensis	23.48; 20.72; 23.63	4.31;3.82;3.92	0.93;0.73; 0.66;0.87; 0.85;0.77; 0.89;0.79; 0.72	0.69;0.48;0.58;0.60;0.59;0.66;0.69;0.60;0.52	0.93;0.74;0.92;0.94;0.78;0.88;0.86	0.41;0.51;0.61;0.57;0.53;0.79;0.59	1	1	0	1;2	1
Wayt, T.	4979	Aniba panurensis	134.50;113.14;142.97	3.94;3.57;3.01	0.68;0.64; 0.82;0.70; 0.83;0.59; 0.57;0.61; 0.61	0.46;0.48;0.58;0.51;0.43;0.51;0.52;0.46;0.41	0.91;0.69;0.78;0.79;0.80;0.70;0.70;0.77	0.77;0.61;0.63;0.51;0.59;0.75;0.58;0.72	1	1	0	1	0
Valenzuela, L.	12353	Aniba panurensis	81.61; 76.12; 51.60	5.13;3.42;3.12	1.08;1.07; 1.05;0.78; 0.76;0.77; 0.81;0.90	0.72;0.73;0.72;0.44;0.38;0.48;0.52;0.41	0.91;1;1.01;0.81;0.88; 0.70;0.79	0.50;0.47;0.57;0.52;0.41;0.40;0.43	1	1	1	1	0
Vásquez, R.	10561	Aniba panurensis	35.95; 48.02	4.04;3.09;4.01	1.09;1.06; 1.31;1.06; 1.03;1.03; 1.01;1.02; 1.03	0.64;0.75;0.99;0.54;0.54;0.68;0.75;0.73;0.67	1.13;1;1.12;1.03;0.88; 1.07;1.01;1.02;1.03	0.94;0.89;0.86;0.78;0.67;0.75;0.62;0.61;0.76	0	0	0	1	1
Vicentini, A.	614	Aniba panurensis	115.21;132.26;148.97	4.37;4.66;4.99	1.18;0.96; 1.08;0.98; 0.97;1.06; 1.03;1.07	1.01;0.87;0.98;0.86;0.60;0.84;0.69;0.70	0.96;1.12;1.11;1.06;0.96;1.05;0.89;0.95	0.86;1.21;1.11;0.99;0.95;1.07;0.72;0.89	1	1	1	1	1
Vicentini, A.	617	Aniba panurensis	100.99;69.28; 119.76	2.97;3.05;3.16	0.86;0.95; 0.84;0.82; 0.86;1.01; 0.93;0.94; 0.97	0.53;0.66;0.65;0.54;0.60;0.68;0.50;0.67	0.81;0.86;0.92;0.79;0.76;0.93;0.88;;1.05;0.93	0.57;0.59;0.46;0.50;0.67;0.75;0.64;0.56;0.74	1	1	0;1	1;2	1
Vicentini, A.	677	Aniba panurensis	110.85	3.41;3.25;3.81	0.96;0.89; 0.90;0.85; 0.71;0.93; 0.81;0.82	0.69;0.70;0.74;0.62;0.61;0.64;0.57;0.61	0.82;0.94;0.97;0.90;0.87;0.79;0.89;0.87	0.73;0.88;0.88;0.64;0.58;0.66;0.88;0.81	1	1	1	1	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Vieira, M.G.G.	776	Aniba panurensis	60.97; 40.25; 53.10	2.69;2.90;3.29	0.68;0.81; 0.48;0.71; 0.90;0.87; 0.86;0.68; 0.66	0.52;0.48;0.57;0.49;0.51;0.37;0.48;0.47;	0.74;0.75;0.75;0.85;0.76;0.78;0.75;0.72;0.70	0.45;0.47;0.48;0.49;0.35;0.39;0.33;0.47;0.40	1	1	0	1	1
Vieira, M.G.G.	804	Aniba panurensis	35.36; 37.45; 23.40	4.62;4.54;3.98	0.99;0.95; 0.97;0.92; 0.87;0.92; 1.01;1.06; 0.99	0.72;0.66;0.69;0.55;0.55;0.60;0.65;0.70	0.88;0.90;0.89;0.84;0.73;0.84;0.83;0.87;0.79	0.79;0.66;0.82;0.76;0.75;0.75;0.58;0.62;0.64	1	1	0	1	1
Villa, G.	527	Aniba panurensis	92.71; 86.22; 99.16	3.97;4.28;5.12	1.71;1.51; 1.56;1.44; 1.61;1.45; 1.41	0.78;0.92;0.60;0.85;0.62;0.63;0.57	1.27;1.48;1.58;1.32;1.39;1.46;1.36;1.59	0.96;1.01;0.84;0.95;0.75;0.76	0	1	0	1;2	1
Werff, H. van der	10169	Aniba panurensis	39;58.05;40.20	3.39;3.64;3.61	0.97;0.97; 0.93;0.98; 0.89;0.99; 0.98;0.84; 0.90	0.56;0.54;0.68;0.65;0.56;0.47;0.62;0.56	1.17;0.97;1.07;1.21;1.09;0.86;1;0.99	0.58;0.80;0.71;0.74;0.75;0.60;0.65	1	1	1	1	0
Werff, H. van der	10274	Aniba panurensis	50.72; 72.90	3.26;3.31	0.84;0.83; 0.79	0.61;0.57;0.54;	0.77;0.84;0.91	0.74;0.72;0.66	1	1	0	1;3	1
Batista, L.T.	1	Aniba parviflora		2.86;2.68;2.78	0.51;0.59; 0.60;0.61; 0.67;0.68; 0.62;0.60	0.37;0.34;0.35;0.37;0.39;0.42;0.39;0.47	0.73;0.74;0.75;0.83;0.75;0.87;0.72	0.42;0.66;0.51;0.60;0.48;0.60;0.63	1	1	1	1	1
Clarke, H.D.	7722	Aniba parviflora	18.74; 15.74; 12.70	2.66;3.43;2.48	0.66;0.59; 0.63;0.51; 0.53;0.51; 0.65;0.61; 0.65	0.50;0.44;0.48;0.45;0.36;0.44;0.46;0.52;0.63	0.85;0.93;0.85;0.92;0.78;0.85;0.79;0.70;0.78	0.85;0.66;0.68;0.58;0.88;0.88;0.83;0.83;0.86	1	1	0	1	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Donselaar, J. van	1484	Aniba parviflora	30.39;28.40	2.73;2.69;3.32	0.74;0.67;0.72	0.42;0.55;0.53	0.76;0.73;0.78	0.51;0.50;0.62	1	0	1	1	1
Duarte, A.P.	7366	Aniba parviflora	29.17;30.95	2.61;2.53;2.43	0.63;0.56;0.67;0.68;0.63;0.54;0.72;0.69;0.70	0.46;0.39;0.40;0.30;0.44;0.38	0.84;0.63;0.96;0.80;0.74;0.84;0.72;0.78	0.56;0.50;0.42;0.52;0.53;0.68	1	1	1	1	1
Ducke, A.	19978	Aniba parviflora	28;26.47;35.77	2.46;2.51;2.24	0.76;0.77;0.79;0.90;0.94;0.89;0.80;0.92	0.48;0.64;0.71;0.55;0.60;0.56;0.59;0.63	1.08;0.91;1.02;0.79;0.94;0.97;0.98	0.80;0.68;0.81;0.74;0.65	1	0	0	2	1
Ducke, A.	s.n.	Aniba parviflora		2.77;2.61	0.97;0.88;0.71;0.79;0.81;0.78	0.58;0.62;0.60;0.57;0.65	0.97;0.84;1.02;0.93;0.78	0.83;0.73;0.79;0.76	1	1	1	1	1
Kurz, H.	34	Aniba parviflora	84.77;87.87;47.62	2.84	0.63	0.48	0.95	0.75	1	1	1	1	1
Mori, S.A.	20834	Aniba parviflora	21.48;25.26	3.11;3.20	0.86;0.85;0.86;0.67;0.75;0.79;0.77;0.82	0.53;0.62;0.66;0.50;0.50;0.63;0.67;0.61	1.25;1.16;1.17;1.05;1.17;1.09;1.04;1.12;0.98	1.09;0.74;0.88;0.72;0.83;0.84;0.95;0.83	1	0	0	2	1
Rodrigues, W.A.	6734	Aniba parviflora	92.27;61.02;50.88	3.7	0.79	0.42	0.9	0.66	1	1	1	1	1
Silva, N.T. da	5397	Aniba parviflora	115.52;85.68;44.34	4.12;3.97;4.19	0.89;0.84;0.86;0.91;0.94;1.08;0.84;0.89	0.82;0.63;0.62;0.71;0.63;0.63;0.64;0.68	1.11;1.109;1.02;0.91;1.10;0.99	0.73;0.80;0.81;0.75;0.77	1	0	1	3	1
Vásquez, R.	16828	Aniba parviflora	33.21;20.20	4;3.87;3.34	0.71;0.76;0.77;0.81;	0.45;0.56;0.53;0.36;0.44;0.43	0.80;0.93;0.89;0.93;0.9	0.63;0.64;0.68;0.76;0.7	1	0	0	1	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
					0.73;0.70; 0.82		4;0.95;1.05 ;0.95;1.03	0;0.81;0.72 ;0.84					
Vicentini, A.	1031	Aniba parviflora	56.76; 45.49; 66.50	2.82;2. 75;2.9 6	0.82;0.65; 0.84;0.65; 0.74;0.74; 0.91;0.78; 0.75	0.33;0.41;0. 43;0.41;0.5 0;0.42;0.38 ;0.35;0.33	0.86;0.83;0. 95;0.97;0.8 2;0.99;0.79	0.57;0.43;0. 50;0.64;0.5 8;0.65	1	1	1	1;2	1
Vicentini, A.	716	Aniba parviflora	84.79; 83.48	2.63;2. 85;3.6 8	0.91;0.76; 0.74;0.83; 0.97;0.84;	0.62;0.68;0. 56;0.59;	1.16;1.06;1. 14;1.08;1.0 4;0.99;1;1. 03;1.02	0.63;0.75;0. 79;0.82;0.6 6;0.64;0.69 ;0.76	1	1	0	1	1
Wisum, A.	445	Aniba pilosa	120.91 ;82.63; 85.27	4.63;4. 58;3.9 3	1.11;0.89; 0.97;1.13; 1.17;1.27; 1.26;1.12	0.66;0.71;0. 76;0.71;0.6 6;0.54	1.19;0.97;1. 07;1.29;1.1 0;1.18;1.25 ;1.21	0.72;0.86;0. 71;0.73;0.6 8;0.61;0.68	1	1	1	3	1
Ayala, F.	467	Aniba rosaeodora	99.57; 103.98 ;48.06		1.18;1.14; 1.04	0.67;0.79;0. 81	1.07;1.11;1. 14	0.73;0.76;0. 87	1	0	1	1	1
Cavalcant e, P.B.	s.n.	Aniba rosaeodora	66.20; 55.97	2.68;2. 47;2.3 8	0.66;0.69; 0.72;0.65; 0.73;0.66; 0.73;0.65	0.48;0.57;0. 64;0.63;0.6 1;0.56;0.41 ;0.51	0.73;0.65;0. 69;0.72;0.7 0;0.77;0.73 ;0.63	0.70;0.63;0. 62;0.69;0.5 2;0.76;0.63	1	0	0	1	0
Coêlho, D.F.	s.n.	Aniba rosaeodora	40.32; 81.62; 67.41	3.45;3. 20;2.5 4	0.70;0.78; 0.74;0.87; 0.94;0.75	0.61;0.61;0. 67;0.61;0.6 0;0.53	0.66;0.65;0. 85;0.69;0.7 7;0.83	0.89;0.73;0. 77;0.51;0.7 5;0.63	1	1	0	1	1
Coêlho, D.F.	s.n.	Aniba rosaeodora	37;31. 31	3.16;3. 12;3.9 2	0.97;0.93; 1.02;0.99; 0.90;0.87; 1.08;0.91	0.57;0.65;0. 63;0.50;0.4 8;0.69;0.71 ;0.60	0.87;1.05;0. 99;1.08;1.0 4;1.07;1.06 ;1.02;1.12	1.04;0.79;0. 73;0.86;0.7 7;0.84;0.64 ;0.75;0.83	1	1	0	1;2	1
Coêlho, D.F.	s.n.	Aniba rosaeodora	30.14; 23.77; 29.80	2.25	0.61	0.7	0.6	0.71	0	1	1	2	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Coêlho, D.F.	s.n.	Aniba rosaeodora	60;41.78;55.13	2.79	0.84	0.55	1.1	0.5	1	1	1	1	1
Coêlho, D.F.	s.n.	Aniba rosaeodora	69.36;74.32;51.68	2.74;2.57;3.50	0.76;0.82;0.86;1.02	0.49;0.60;0.57;0.48	0.84;0.92;0.87;0.92;0.89;0.87	0.68;0.64;0.57;0.74;0.54;0.72	1	1	0	1;2	1
Coêlho, D.F.	s.n.	Aniba rosaeodora	50.6;40.87;47.16	2.2	0.76	0.54	0.7	0.65	1	1	1	1	0
Croat, T.B.	18198	Aniba rosaeodora	96.68;86.63;51.90	3.06;3.70;3.64	0.92;0.88;1.01;0.96;0.82;0.90;0.93;0.95;0.96	0.70;0.59;0.52;0.58;0.78;0.66;0.51;0.65;0.66	1;0.98;0.96;0.96;0.86;0.99;0.86;0.82;0.96	0.84;0.61;0.59;0.75;0.68;0.56;0.76;0.64;0.74	1	1	1	1	1
Davidse, G.	27187	Aniba rosaeodora	30.29	3.12;3.45;3.44	1.04;1.09;1.06;1.09;1.06;1.10;0.99;0.98;1.06	0.71;0.64;0.65;0.59;0.59;0.52;0.54	1.08;0.97;1.06;1.01;0.97;0.87;0.98;0.99;1.01	0.75;0.76;0.62;0.56;0.55;0.56;0.69	1	1	0	1;3	1
Arévalo, M.F.	501	Aniba rosaeodora	155.5	2.6	0.85	0.63	0.8	0.58	1	1	0	1	1
Gentry, A.H.	24844	Aniba rosaeodora	60.91;63.50;45.90	3.62;4;3.30	1.19;0.99;1.19;1.10;1.11;1.02;1.09;0.99;0.98	0.83;0.76;0.79;0.82;0.96;0.69;0.75	1.18;1.20;1.20;1.01;1.05;0.97;0.93;0.92;0.98	0.83;0.85;0.87;0.91;0.77;0.79;0.74	1	1	0	1	1
Kurz, H.	22	Aniba rosaeodora	113.22;63.40	2.62;3.01;2.56	0.71;0.55;0.66;0.57;0.58;0.52	0.43;0.48;0.45;0.55;0.40;0.36	0.69;0.67;0.59;0.60;0.61;0.54	0.48;0.54;0.55;0.44;0.46;0.39	1	1	0	1	0
Nascimento, J.R.	756	Aniba rosaeodora	57.39;103.13;81.36	2.95;2.97;3.43	0.74;0.71;0.72;0.65;0.64;0.63;	0.52;0.62;0.50;0.63;0.5	0.60;0.73;0.72;0.71;0.6	0.45;0.63;0.41;0.49;0.4	1	1	1	1;2	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
					0.77;0.64;0.59	3;0.51;0.54;0.43	4;0.67;0.71;0.73;0.59	6;0.56;0.35;0.37;0.36					
Pires, M.J.	644	Aniba rosaeodora	50.06; 55.36; 52.30	2.56;2.62;2.53	0.59;0.64;0.61;0.60;0.62;0.65;0.70;0.75;0.55	0.46;0.39;0.48;0.46;0.42;0.42;0.50;0.42;0.53	0.90;0.87;0.96;0.84;0.94;0.82;0.89;0.77;0.85	0.83;0.90;0.77;0.69;0.79;0.74;0.82;0.72;0.67	1	0	1	3	1
Ramos, J.F.	1745	Aniba rosaeodora	77.78; 60.76	3.21;3.35;3.16	0.87;0.85;0.72;0.84;0.74;0.78;0.72;0.76	0.60;0.43;0.58;0.47;0.43;0.46;;0.56;0.49	0.76;0.70;0.76;0.71;0.67	0.56;0.48;0.56;0.44;0.59	1	1	1	1	1
Rimachi, M.	8003	Aniba rosaeodora	116.13	2.86;3.51;2.79	0.80;0.79;0.86;0.86;0.80;0.88;0.84	0.55;0.61;0.66;0.67;0.64;0.56;0.63	0.92;0.87;0.91;0.80;0.68;0.70;0.83;0.73	0.62;0.78;0.73;0.59;0.58;0.62;0.59;0.48	1	0	0	1	1
Rodrigues, W.A.	6001	Aniba rosaeodora	20.16; 23.80	2.2	0.48	0.43	0.63	0.74	1	0	1	1;2	1
Schulz, J.P.	8140	Aniba rosaeodora	84.31	2.34;2.27;2.56	0.69;0.64;0.64;0.70;0.66;0.68;0.55	0.50;0.39;0.42;0.41;0.41;0.35;0.40	0.61;0.59;0.67;0.59;0.62;0.58;0.65;0.63;0.64	0.62;0.55;0.50;0.55;0.55;0.54;0.38;0.34;0.45	1	0	0	1	1
Silva, A.C. da	1	Aniba rosaeodora	68.75; 100.5; 74.73	3.30;3.13;3.34	0.87;0.83;0.90;0.70;0.79;0.73;0.74;0.82;0.80	0.49;0.44;0.56;0.43;0.33;0.37;0.41	0.92;0.84;0.84;0.82;0.67;0.77;0.66;0.83	0.53;0.60;0.49;0.53;0.49;0.44;0.61;0.51	1	0	0	1	1
Souza, J.A. de	s.n.	Aniba rosaeodora	140	4.34;3.52;4.53	0.95;0.90;0.98;0.89;0.90;0.92;0.96;0.99;0.98	0.86;0.81;1.03;0.71;0.66;0.74;0.80;0.79;0.88	0.92;0.95;0.81;1.09;1.03;0.97;1.04;1.01;1	0.63;0.73;0.81;0.61;0.66;0.71;0.77;0.61;0.74	1	1	0	1	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Wilde, L.	7-88	Aniba rosaeodora	68.31; 72.96; 78.61	3.22;2.82;3.33	0.72;0.67; 0.66;0.74; 0.65;0.71; 0.66;0.58; 0.74	0.76;0.58;0.52;0.62;0.52;0.63;0.60;0.60	0.87;0.85;0.68;0.69;0.69;0.61;0.60;0.63	0.87;0.56;0.59;0.47;0.57;0.54;0.56	1	1	1	1	1
Anonymous	s.n.	Aniba sp.	47.50; 30.49	2.56;2.64;3.19	0.86;1;0.91;0.76;0.88;0.81;0.88	0.72;0.83;0.92;0.60;0.55;0.66;0.57	1.45;1.42;1.10;1.11;0.99;1.07	0.98;1.09;0.88;0.97;1.01;1.02	0	0	1	2	1
Asanza, J.L.J.	13363	Aniba sp.	38.83; 14.16	4.12;5.17;2.98	0.91;1.08; 0.90;0.85; 0.86;0.92; 1;0.96	0.61;0.66;0.57;0.55;0.58;0.59;0.49;0.56	1.01;1;1.04;0.87;0.88; 0.90;1.06;1.01;0.97	0.80;0.59;0.58;0.54;0.56;0.74;0.66	1	0	0	1;2	1
Bisby, F.A.	18117	Aniba sp.	88.43	2.75;2.71;3.03	0.62;0.70; 0.69;0.69; 0.64;0.69; 0.62;0.68	0.45;0.60;0.45;0.50;0.37;0.52	0.84;0.92;1.05;0.85;0.80;0.81;0.75;0.80	0.64;0.63;0.61;0.69;0.56	1	1	1	1	1
Campos, J.	4688	Aniba sp.	32.62; 45.74; 35.25	5.95;4.59;5.74	1.42;1.33; 1.45;1.39; 1.38;1.24; 1.26;1.41; 1.42	0.85;0.85;0.74;0.73;0.80;0.84;0.75;0.88	1.48;1.20;1.43;1.25;1.15;1.30;1.17;1.28	1.13;1.10;1.05;0.96;0.74	1	1	0	1	0
Campos, J.	5710	Aniba sp.	30.52	4.27;3.44	1.767;1.61;1.49;1.18;1.26;1.21;1.22;1.28;1.23	0.94;0.81;1.01;0.78;0.79;0.86;0.94;0.65;0.69	1.68;1.54;1.18;1.34;1.13;1.02;1.17	0.86;0.83;0.66;0.62;0.82;0.98;0.70	1	1	0	3	1
Clark, J.L.	10288	Aniba sp.	88.53; 92.95; 97.72	3.75;4.50;4.40	1.21;1.27; 1.27;1.10; 1.27;1.13; 1.27;1.06	1.13;1.05;1.15;0.90;0.60;0.94;0.94;0.84	1.07;1.08;1.28;1.01;1.10;1.11;1.17;1.13;1.01	1.08;1.32;0.84;0.99;0.91;0.94;1.18	1	1	0	1	0

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Croat, T.B.	104088	Aniba sp.	56.54; 75.22	3.02;3.32	1.03;1.10; 1.11;1;0.97;0.94	0.84;0.82;0.84;0.84;0.76;1.08	0.99;0.92;0.97;0.94;0.87;0.85	0.93;0.95;1.03;0.89;0.95;0.91	1	1	0	1	1
Díaz, C.	8790	Aniba sp.	11.32; 15.43; 16.36	2.83	1.29;1.31; 1.18;1.06; 1	0.99;0.82;0.60;0.70;0.64	1.21;1.37;1.02;1.02;1.04	0.97;0.99;0.77;0.57;0.58	1	1	1	1;2	1
Ferreira, C.A.C.	352	Aniba sp.	82.26; 128.52	3.92;4.18;5.07	0.70;0.64; 0.71;0.64; 0.62;0.67; 0.75;0.60	0.48;0.47;0.42;0.42;0.43;0.41;0.38;0.38	0.74;0.76;0.91;0.73;0.69;0.69;0.82;0.72	0.64;0.65;0.61;0.67;0.50;0.59;0.58;0.55	1	0	0	1	0
Ferreira, C.A.C.	7601	Aniba sp.	55	3	0.6	0.5	0.9	0.7	1	1	0	1	1
Fonnegra, R.	4410	Aniba sp.	53.84; 64.14; 52.52	3.57;4.49;3.38	1.55;1.51; 1.58;1.40; 1.40;1.38; 1.44;1.44; 1.39	1.16;1.22;1.14;1.23;1.12;1.23;1.04;0.95;1.17	1.50;1.40;1.49;1.37;1.26;1.35;1.35;1.35;1.29	1.35;1.22;1.42;1.07;1.10;1.22;1.03;1.06;0.97	1	1	0	1	1
Galiano, W.L.	6727	Aniba sp.	19.49; 15.18; 12.62	2.40;2.29;2.23	0.68;0.75; 0.66;0.53; 0.61;0.64; 0.72;0.67; 0.73	0.61;0.57;0.70;0.52;0.42;0.41;0.60;0.50;0.69	0.82;0.81;0.71;1.02;0.98;0.89;0.798;0.76;0.83	0.63;0.57;0.71;0.56;0.72;0.64;0.632;0.66;0.67	1	0	0	1;2	1
Guarin, F.A.	273	Aniba sp.	94.49; 97.60; 139.15	3.31;2.52;2.79	0.98;1.01; 0.86;0.83; 0.70;0.88; 0.86;0.86; 0.82	0.82;0.73;0.61;0.80;0.54;0.80;0.64;0.53;0.52	1.05;1.06;1.10;1.06;1.01;0.97;0.99;0.98;1	1.04;1.12;1.10;1.13;0.87;0.98;0.94;0.72;0.91	1	1	0	1	1
Filho, H.	3	Aniba sp.	18.71; 15.13; 14.60	2.32;2.47;2.44	0.68;0.62; 0.78;0.67; 0.58;0.39; 0.68;0.70; 0.62	0.28;0.32;0.40;0.28;0.40;0.39;0.33;0.34;0.45	0.75;0.82;0.76;0.79;0.77;0.85;0.77;0.77	0.61;0.60;0.68;0.58;0.66;0.50;0.65;0.57;0.66	0	0	1	2;3	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Homeier, J.	297	Aniba sp.	29.27; 32.25; 26.72	3.74;3.17;3.49	1.16;1.38; 1.20;1.24; 1.22;1.24; 1.37;1.32; 1.36	0.80;0.89;0.79;0.81;0.75;0.84;0.70;0.80;0.71	1.13;1.17;1;1.26;1.17; 1.26;1.35	1.11;0.78;1.04;0.86;0.81;0.67;0.67	1	1	0	2;3	1
Macêdo, M.	566	Aniba sp.	23;53; 60	4.75;3.92;3.69	1.27;1.31; 1.30;1.11; 1.22;1.38; 1.21;1.23	0.84;0.76;0.71;1.02;0.89;0.87;0.86;0.78	1.22;1.22;1.22;1.15;1.29;1.15;1.11;1.17;1.27	0.58;0.63;0.78;0.75;0.75;0.81;0.71;0.73;0.77	1	1	0	1	1
Macêdo, M.	717	Aniba sp.	40.51	3.58;4.32;5.74	1.21;1.26; 1.30;1.37; 1.24;1.39; 1.12;1.17; 1.28	0.59;0.66;0.87;0.70;0.94;0.99;0.83;0.76	1.23;1.29;1.14;1.15;1.22;1.24	0.77;0.73;1.03;0.84;1.07;0.66	1	1	1	1	1
Monteiro, O.P.	1218	Aniba sp.	22.24; 23.12; 16.67	3.29	0.86	0.46	0.8	0.6	0	0	1	2	1
Monteiro, O.P.	326	Aniba sp.	137.9; 113.23;60.60	3.17;3.59;3.40	0.97;1.07; 1.03	0.82;0.71;0.74	0.99;0.87;0.95	0.65;0.60;0.66	1	0	0	1;2	1
Øllgaard	9198	Aniba sp.	57.89	3.37;3.59;3.54	1.20;1.23; 1.25;1.25; 1.18;1.31; 1.26;1.35; 1.26	0.83;0.73;0.77;0.74;0.77;0.71;0.78	1.21;1.17;1.17;1.18;1.19;1.14;1.23;1.20	0.95;0.80;0.90;0.84;0.89;0.82;0.64	1	1	0	1	1
Ortega, F.J.	3126	Aniba sp.	44.66	2.89;3.21;2.69	1.01;1.04; 1.09;0.82; 0.86;0.88; 0.87;0.84; 0.90	0.55;0.57;0.66;0.51;0.49;0.49;0.56;0.45;0.55	1.07;1.12;0.97;0.91;0.87;0.87;0.87;0.84;0.90	0.58;0.72;0.69;0.56;0.63;0.65;0.66;0.63;0.72	1	0	0;1	1	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Palacios, W.A.	5098	Aniba sp.	115.35;148.59;85.56	4.79;4.99;6.29	1.44;1.28;1.33;1.32;1.06;1.22;1.18;1.25	1.01;0.92;1.18;1.07;0.77;1.12;0.92;1.22	1.08;0.97;1.21;1.15;0.99;1.26;1.08;1.14	1.12;1.38;0.94;0.92;1.33;1.16;1.25;1.30	1	1	0	1	1
Pereira-Silva, G.	14425	Aniba sp.	45.30;56.57;33.27	3.64;3.33;2.85	1.06;1.04;1.02;0.99;0.93;1.07;0.99;0.87;0.89	1.09;1.21;1.22;1.18;1.20;1.16;0.93;0.97;1.08	1.05;1;0.91;1.07;0.82;0.86;0.96;0.86	0.98;1.01;1.16;1.04;0.95;0.93;0.96;1;0.83	0	0	1	1	1
Reategui, R.	s.n.	Aniba sp.	175.32;220.5	3.36;3.31;3.93	1.08;1.06;0.94	0.83;0.71;0.95	0.97;1.01;1.01	0.66;0.65;0.87	0	1	0	3	1
Rodrigues, W.A.	6714	Aniba sp.	59.15;27.86	2.9	0.73	0.4	0.75	0.42	0	0	1	1	1
Smith, R.F.	9679	Aniba sp.	52.90;57.04;31.08	4.43;5.14;4.05	1.97;1.80;1.89;1.93;1.85;1.84;1.93;1.88;1.83	1.50;1.54;1.55;1.04;1.27;1.41;1.52;1.61	1.98;1.92;1.81;1.57;1.84;1.87;1.70;1.70;2.03	1.67;1.40;1.14;1.09;1.29;1.31	1	1	0	1	1
Soares, E.	277	Aniba sp.	85.51;120.78;89.54	3.58;3.31;3.34	0.98;0.88;0.92;0.99;0.98;1.01;1;0.93;0.71	0.71;0.74;0.83;0.77;0.84;0.96;0.73;0.68	1.12;1.04;1.05;1.12;1.08;1.09;1.16;1.08;1.03	0.93;0.75;0.82;0.89;0.83;0.78;0.76;0.91	1	1	0	1	1
Teixeira, L.O.A.	1156	Aniba sp.	15.27;14.09;26.26	2.73;3.07;2.72	0.61;0.41;0.52;0.46;0.55;0.47	0.34;0.30;0.34;0.36;0.38;0.27	0.81;0.83;0.64;0.74;0.78	0.56;0.54;0.50;0.41;0.63	1	1	0	1	1
Teixeira, L.O.A.	751	Aniba sp.	179.60;119.46;105	3.09;2.99;3.01	0.75;0.72;0.72;0.62;0.61;0.64;0.63;0.60	0.54;0.45;0.49;0.46;0.40;0.43;0.40;0.50	0.60;0.71;0.79;0.83;0.78;0.72;0.79;0.71	0.53;0.67;0.69;0.78;0.70;0.55;0.54;0.56	1	1	0	1	0

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Thomas, W.W.	4994	Aniba sp.	97.97; 125;65.78	2.82;3.04;3.14	0.70;0.70; 0.68;0.75; 0.76;0.83	0.39;0.42;0.53;0.46;0.32;0.51	0.72;0.69;0.80;0.75;0.74	0.58;0.63;0.64;0.66;0.73	1	1	0	1	1
Valenzuela, L.	3986	Aniba sp.	18.90; 18.90; 13.89	2.22;2.05;2.37	0.67;0.61; 0.65;0.59; 0.61;0.64; 0.73;0.62; 0.57	0.41;0.45;0.45;0.46;0.44;0.36;0.41;0.40;0.49	0.65;0.55;0.60;0.65;0.69;0.70;0.71;0.69;0.66	0.43;0.44;0.53;0.38;0.42;0.38;0.41;0.39	0	0	1	1;2	1
Vargas, W.G.	1070	Aniba sp.	97.86; 108.40	5.71;3.67;4.09	1.80;1.58; 1.79;1.72; 1.77;1.68; 1.79;1.72; 1.80	1.61;1.62;1.60;1.63;1.51;1.51;1.49;1.23;1.21	1.85;1.80;1.83;1.76;1.63;1.61;1.66;1.68	1.30;1.23;1.38;1.13;1.09;0.92;0.79;1.20	1	1	0	1	1
Vieira, M.G.G.	305	Aniba sp.	69.73; 40.43; 60.04	5.72;4.10;5.04	1.01;1.15; 1.07;1.03; 0.99;1.01; 1.05;0.99; 0.97	0.59;0.73;0.68;0.45;0.52;0.46;0.43;0.43;0.55	1.06;1.08;1.11;0.94;0.93;0.93;0.94;0.99;0.88	0.69;0.78;0.70;0.45;0.48;0.63;0.51;0.37;0.44	1	1	0	2	1
Werff, H. van der	16927	Aniba sp.	58.68; 62.60; 31.78	3.20;3.22;3.20	1.23;1.18; 1.44;1.08; 1.01;1.18; 1.21;1.11	1.21;1.33;1.19;1.05;1.25;1.31;1.26;1.23	1.11;1.07;1.10;1.02;0.90;0.99;1.06;1.02;1.16	1.15;1.17;0.95;0.96;0.96;1.13;1.24;1.31	1	1	0	1	1
Werff, H. van der	9023	Aniba sp.	13.31; 16.64; 18.33	5.75;4.39;4.77	1.34;1.47; 1.38;1.11; 1.23;1.15; 1.20;1.29; 1.24	1.26;0.94;1.18;1;0.97;1.07;1.02;0.99;1.10	1.45;1.28;1.36;1.20;1.12;1.25;1.26;1.09;1.51	0.98;0.88;1.21;0.94;0.92;0.92;0.87;1.09;0.82	1	1	0	3	1
Werff, H. van der	9282	Aniba sp.	34.46; 46.92; 42.88	5.65;3.82;2.98	1.38;1.38; 1.72;1.08; 1.33;1.11; 1.14;1.13	1.33;1.09;1.29;0.90;0.90;0.78;0.90;0.91;1.04	1.28;1.30;1.42;1.02;1.02;1.20;1.01;0.87;1.06	1.11;1.19;1.33;0.89;0.85;0.93;0.71;0.71	1	1	0	1	1

Collector	Collector number	Taxon	Inflo. ln	Fl. ln	Ext. tep. ln	Ext. tep. wd	Int. tep. ln	Int. tep. wd	Pub. ov.	Pub fl. tube	Out. ant. wd	Out. ant. op.	Out. stm. con.
Werff, H. van der	9673	Aniba sp.	57.39; 48.12; 43.43	3.63;3.15;3.14	1.16;1.04; 1.05;1.10; 1.10;0.86; 0.99;1.07; 1.04	0.97;0.91;0.95;0.78;0.62;0.71;0.81;0.77;0.84	1.09;1.02;0.96;1.03;1.06;0.99;1.01;1.04;1.04	0.92;0.84;0.98;0.75;0.75;0.72;0.67;0.72	1	0	0	1	1
Wisum, A.	94	Aniba sp.	49.96; 23.62	2.85;3.16	0.80;0.75; 0.61;0.61; 0.67;0.65	0.55;0.47;0.57;0.51	0.67;0.53;0.68;0.62;0.60	0.48;0.57;0.38;0.50;0.52	1	1	0	1	0