The Scarce Family Composition of Seedlings and Saplings in Different-Aged Secondary Forests

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Abstract. The composition and distribution of seedlings and sapling families play critical roles in forest succession. The aim of this study was to analyze families of seedlings and saplings that are scarce in secondary forests of different ages. A vegetation survey was conducted for all seedlings and saplings with a diameter at breast height (DBH) of less than 5 cm in each one ha plot of 3-, 5-, 10-, and 20-year-old secondary forests in Sarawak, Malaysia. The family scarcity categories were assessed based on the number of individuals, species, and genera. The scarce category of seedling and sapling families was 22 of 38 families in three- and five-year-old secondary forests. While 27 of the 55 families and 28 of the 46 families were in 10 and 20-years-old secondary forests, respectively. In the years secondary forest, there were 3-, 16, and three families were categorized as *scarce*, *very scarce*, and *extremely scarce* families, respectively. The scarce, very scarce, and extremely scarce families of the five-year secondary forests were 4-, 16-, and 2 families, respectively. Of the 27 families categorized, seven were scarce families, 12 were very scarce families, and eight were extremely scarce families in 10 years of secondary forest. In the 20-year-old secondary forest, 3, 3, and 22 families were categorized as scarce, extremely scarce, and very scarce, respectively. Information about scarce plant families in secondary forests of different ages can be considered when selecting plant species for forest management and rehabilitation programs.

Keywords: Plant composition, scarce family, secondary forest, seedling.

1 Introduction

Forests play an important role in the lives of humans and other living organisms. Both primary and secondary forests can prevent climate change. Gap-based silvicultural systems are of particular interest in secondary forest management, because gaps are associated with regeneration and tree species diversity [1]. Secondary forests are managed for many reasons, one of which is plantation. If plantation forests are commonly managed less intensively, they can slowly turn into new secondary forests or primary forests. The new secondary forest can have complex structural and floristic diversity

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through natural ecological processes [2], becoming an established ecosystem after the abandonment period.

However, biodiversity in secondary forests is affected by global changes worldwide. This change has different consequences for individual species and the environment in secondary forests. The changing process of secondary forests requires periods that differ between secondary forests and other forests. Secondary forests of different ages have different biodiversity, including seedlings and saplings. Forest age had a significant effect on seed and seedling survival, with older secondary forests showing higher survival rates. This shows that once succession has started and some canopy has formed, reintroduction of different species to accelerate forest recovery can be successful, even in young secondary forests [3]. A previous study [4] reported that the changing dynamics of tree species composition and diversity in secondary forests in northern China in response to climate change are completely different. These findings might facilitate a favorable succession trend for secondary communities under the influence of climate change and improve the positive succession of secondary communities to produce ecological benefits of high value.

Global changes can trigger a decline in the number and types of plant species, especially seedlings and saplings in secondary forests. However, if the number of seedlings and saplings continues to decrease, there will be scarcity. Scarcity is known to relate to vulnerability and the risk of extinction; scarcity is a detrimental factor that has accelerated with global change [5]. Comparisons between common and scarce species or invasive and non-invasive species can use biotic interactions [6]. It is recommended that scarce tree species, characteristics of the target forest ecosystem, and those with large seeds should be added to the mix of planted framework tree species, and their natural colonization is unlikely. This would enhance species diversity and result in better restoration outcomes [7].

Many studies of scarce tree species have been conducted in tropical forests [8, 9, 10]. However, there is limited research on scarce seedlings and samplings in secondary forests, whereas the composition and distribution of seedlings and saplings by family affects the succession process in secondary forests. Therefore, it is necessary to analyze scarcity patterns as a conservation directive, where it serves data and information about priority targets to overcome threats of scarce or incomplete habitats [5].

The objective of this study was to investigate families of seedlings and saplings that are scarcely found in secondary forests of different ages. This study offers information about the scarce families of seedlings and saplings in secondary forests, which can be used as a foundation for managing and conserving secondary forests.

2 Methods

2.1 Study Sites

This study was conducted during four periods of abandonment: 3, 5, 10 and 20 years old secondary forest in Sabal, Sri Aman, Sarawak, East Malaysia, as reported in previous studies [11, 12]. The study plots at Sabal were located approximately 110 km Southeast of Kuching along the Kuching-Sri Aman Road, 5–15 km from the Sabal Agroforestry Centre.

2.2 Data Collection and Analysis

Twenty-five 20 × 20 m subplots were established in 3-, 5-, 10-, and 20-year-old secondary forests. All woody trees within the plot with a diameter at breast height (DBH) of < 5 cm were enumerated and identified. The scarcity of the vegetation family in the study site was classified into (1) 'scarce family' is if a family was represented by a single genus, (2) 'very scarce family' is if a family was represented by single genus and species and (3) 'extremely scarce family' is if a family was represented by single genus, species and individual (stem) [8, 9].

3 Results and Discussion

Twenty-two families were scarce in both the sapling forest and 3- and 5-year-old secondary forests. Additionally, 27 families were scarce in the 10-year-old secondary forest and 28 families were scarce in the 20-year-old secondary forest. The scarcity of seedlings and saplings (DBH < 5 cm) in terms of family, genus, species, and number of individuals in the study sites are presented in Tables 1 to 4.

In the 3-year-old secondary forest, there were three, 16, and three families categorized as 'scarce,' very scarce' and 'extremely scarce families, respectively. Apocynaceae, Dilleniaceae, and Myrtaceae are represented by a single genus (scarce families). The three families, Ixonanthaceae, Meliaceae, and Sterculiaceae were represented by a single genus, species, and individual (extremely scarce families). The remaining 16 families were categorized as very scarce families, represented by a single genus and species (Table 1).

Table 1. Scarcity of seedling and sapling families (DBH <5 cm) in terms of genus, species, and number of individuals in one hectare of a 3-year-old secondary forest.

No.	Family	Number of family (ha^{-1})	Number of genera (ha^{-1})		Number of species (ha^{-1})		Number of individuals (ha^{-1})		Category
			Total	%	Total	%	Total	%	
1	Apocynaceae	1	1	1.35	2	2.06	29	0.87	*
2	Dilleniaceae	1	1	1.35	2	2.06	291	8.73	*
3	Myrtaceae	1	1	1.35	4	4.12	178	5.34	*
4	Flacourtiaceae	1	1	1.35	1	1.03	2	0.06	**
5	Myrsinaceae	1	1	1.35	1	1.03	2	0.06	**
6	Actinidiaceae	1	1	1.35	1	1.03	3	0.09	**
7	Sapotaceae	1	1	1.35	1	1.03	3	0.09	**
8	Symplocaceae	1	1	1.35	1	1.03	3	0.09	**
9	Asteraceae	1	1	1.35	1	1.03	4	0.12	**
10	Lecythidaceae	1	1	1.35	1	1.03	4	0.12	**
11	Myristicaceae	1	1	1.35	1	1.03	5	0.15	**
12	Elaeocarpaceae	1	1	1.35	1	1.03	9	0.27	**
13	Rhizophoraceae	1	1	1.35	1	1.03	13	0.39	**
14	Proteaceae	1	1	1.35	1	1.03	14	0.42	**
15	Aquifoliaceae	1	1	1.35	1	1.03	33	0.99	**

No.	Family	Number of family (ha^{-1})	Number of genera (ha^{-1})		Number of species (ha^{-1})		Number of individuals (ha^{-1})		Category
			Total	%	Total	%	Total	%	
16	Ampelidaceae	1	1	1.35	1	1.03	52	1.56	**
17	Urticaceae	1	1	1.35	1	1.03	67	2.01	**
18	Rhamnaceae	1	1	1.35	1	1.03	68	2.04	**
19	Scrophulariaceae	1	1	1.35	1	1.03	117	3.51	**
20	Ixonanthaceae	1	1	1.35	1	1.03	1	0.03	***
21	Meliaceae	1	1	1.35	1	1.03	1	0.03	***
22	Sterculiaceae	1	1	1.35	1	1.03	1	0.03	***
	Total	22	22	29.73	27	27.84	900	27.01	
	Total per hectare	38	74	100.00	97	100.00	3332	100.00	
						Total	*		3
							**		16
							***		3

Note: * = Scarce family, ** = Very scarce family, *** = Extremely scarce family.

On land that has been left untreated for 3 years, the number of seedlings and weeds per hectare are widely distributed among various families, namely Dilleniaceae (291), Clusiaceae (283), Theaceae (257), Myrtaceae (178), Rutaceae (140), Scrophulariaceae (117) and Rubiaceae (111) [13]. According to density and SDR, the plant seedlings and saplings in 3 and 5 years old secondary forests were dominated by light-demanding and fast-growing species such as *M. malabathricum, P. alternifolium, F. aurata*, Dillenia spp., and Macaranga spp. [14].

The scarce, very scarce, and extremely scarce families of the 5-year-old secondary forests were 4, 16, and 2 families, respectively. Four families, Burseraceae, Apocynaceae, Lauraceae, and Dilleniaceae, were classified as scarce families with a single genus. Proteaceae and Symplocaceae were included in extremely scarce families with single genera, species, and individual. The other 16 families were categorized as very scarce at this site (Table 2).

Table 2. Scarcity of seedling and sapling families (DBH <5 cm) in terms of genus, species, and number of individuals in 1 ha of a 5-year-old secondary forest.

No.	Family	No. of family (ha^{-1})	No. of genera (ha^{-1})		No. of species (ha^{-1})		No. of individuals (ha^{-1})		Category
			Total	%	Total	%	Total	%	
1	Burseraceae	1	1	1.39	2	2.15	2	0.06	*
2	Apocynaceae	1	1	1.39	2	2.15	137	4.35	*
3	Lauraceae	1	1	1.39	3	3.23	12	0.38	*
4	Dilleniaceae	1	1	1.39	3	3.23	326	10.35	*
5	Rosaceae	1	1	1.39	1	1.08	2	0.06	**
6	Sapindaceae	1	1	1.39	1	1.08	2	0.06	**
7	Sterculiaceae	1	1	1.39	1	1.08	2	0.06	**
8	Actinidiaceae	1	1	1.39	1	1.08	3	0.10	**
9	Fagaceae	1	1	1.39	1	1.08	3	0.10	**
10	Elaeocarpaceae	1	1	1.39	1	1.08	5	0.16	**

No.	Family	No. of family (ha^{-1})	No. of genera (ha^{-1})		No. of species (ha^{-1})		No. of individuals (ha^{-1})		Category
			Total	%	Total	%	Total	%	
11	Lecythidaceae	1	1	1.39	1	1.08	5	0.16	**
12	Myrsinaceae	1	1	1.39	1	1.08	5	0.16	**
13	Anisophylleaceae	1	1	1.39	1	1.08	9	0.29	**
14	Ixonanthaceae	1	1	1.39	1	1.08	11	0.35	**
15	Asteraceae	1	1	1.39	1	1.08	17	0.54	**
16	Loganiaceae	1	1	1.39	1	1.08	22	0.70	**
17	Rhamnaceae	1	1	1.39	1	1.08	24	0.76	**
18	Aquifoliaceae	1	1	1.39	1	1.08	44	1.40	**
19	Ampelidaceae	1	1	1.39	1	1.08	85	2.70	**
20	Rutaceae	1	1	1.39	1	1.08	127	4.03	**
21	Proteaceae	1	1	1.39	1	1.08	1	0.03	***
22	Symplocaceae	1	1	1.39	1	1.08	1	0.03	***
	Total	22	22	30,56	28	30,11	845	26.83	
	Total per hectare	38	72	100,00	93	100,00	3149	100.00	
						Total	*		4
							**		16
							***		2

Note: * = Scarce family, ** = Very scarce family, *** = Extremely scarce family.

Nine other families such as Dilleniaceae (326), Theaceae (277), Clusiaceae (185), Myrtaceae (166), Apocynaceae (137), Rubiaceae (127), Rutaceae (127), Thymelaeaceae (116) and Verbenaceae (106) are also co-dominant families based on seedling and weaning density per hectare in 5 years of land abandoned after cultivation shifted [13]. Some dominant families were found to live in secondary forests aged 5 and 10 years, namely Euphorbiaceae, Dilleniaceae, and Verbenaceae, which were categorized according to the number of trees. In 5- and 10-years-old fallow lands after abandonment, *Macaranga gigantea* (Euphorbiaceae) is the most dominant tree species in terms of basal area and volume per hectare [11].

Of the 27 families observed, only seven (Anisophylleaceae, Oxalidaceae, Rosaceae, Polygalaceae, Elaeocarpaceae, Dilleniaceae, and Ebenaceae) were observed in the 10-year-old secondary forests. The remaining 12 families were classified as being very scarce. Eight families with a single genus, species, and number of individuals were included in extremely scarce families, namely Actinidiaceae, Alangiaceae, Araliaceae, Bombacaceae, Flacourtiaceae, Malvaceae, Myrsinaceae, and Oleaceae (Table 3).

Table 3. Scarcity of seedling and sapling families (DBH <5 cm) in terms of genus, species, and number of individuals in 1 ha of 10-year-old secondary forest.

No.	Family	No. of family (ha^{-1})	No. of genera (ha^{-1})		No. of species (ha^{-1})		No. of individuals (ha^{-1})		Category
			Total	%	Total	%	Total	%	
1	Anisophylleaceae	1	1	0.71	2	0.91	5	0.16	*
2	Oxalidaceae	1	1	0.71	2	0.91	5	0.16	*
3	Rosaceae	1	1	0.71	2	0.91	6	0.19	*
4	Polygalaceae	1	1	0.71	3	1.36	47	1.52	*

No.	Family	No. of family (ha^{-1})	No. of genera (ha^{-1})		No. of species (ha^{-1})		No. of individuals (ha^{-1})		Category
			Total	%	Total	%	Total	%	
5	Elaeocarpaceae	1	1	0.71	3	1.36	79	2.55	*
6	Dilleniaceae	1	1	0.71	4	1.82	124	4.01	*
7	Ebenaceae	1	1	0.71	5	2.27	116	3.75	*
8	Ulmaceae	1	1	0.71	1	0.45	2	0.06	**
9	Araucariaceae	1	1	0.71	1	0.45	3	0.10	**
10	Asteraceae	1	1	0.71	1	0.45	3	0.10	**
11	Olacaceae	1	1	0.71	1	0.45	3	0.10	**
12	Simaroubaceae	1	1	0.71	1	0.45	3	0.10	**
13	Thymelaeaceae	1	1	0.71	1	0.45	3	0.10	**
14	Aquifoliaceae	1	1	0.71	1	0.45	4	0.13	**
15	Meliaceae	1	1	0.71	1	0.45	8	0.26	**
16	Sabiaceae	1	1	0.71	1	0.45	8	0.26	**
17	Icacinaceae	1	1	0.71	1	0.45	14	0.45	**
18	Lecythidaceae	1	1	0.71	1	0.45	14	0.45	**
19	Ampelidaceae	1	1	0.71	1	0.45	57	1.84	**
20	Actinidiaceae	1	1	0.71	1	0.45	1	0.03	***
21	Alangiaceae	1	1	0.71	1	0.45	1	0.03	***
22	Araliaceae	1	1	0.71	1	0.45	1	0.03	***
23	Bombacaceae	1	1	0.71	1	0.45	1	0.03	***
24	Flacourtiaceae	1	1	0.71	1	0.45	1	0.03	***
25	Malvaceae	1	1	0.71	1	0.45	1	0.03	***
26	Myrsinaceae	1	1	0.71	1	0.45	1	0.03	***
27	Oleaceae	1	1	0.71	1	0.45	1	0.03	***
	Total	25	27	19.29	41	18.64	512	16.56	
	Total per ha	55	140	100.00	220	100.00	3092	100.00	
						Total	*		7
							**		12
							***		8

Note: * = Scarce family, ** = Very scarce family, *** = Extremely scarce family.

There are three families (Dipterocarpaceae, Euphorbiaceae, and Myrtaceae), which are the most dominant families based on the number of seedlings and weeds per hectare in the secondary forest over 10 years (570, 427, and 348 seedlings and weaning) [15]. Although there were no significant differences in large-seeded species enhanced by restoration age, the slightly higher seedlings of large-seeded species in 10-14-year-old forests might be an initial sign of attracting more seedlings of these species in the future [7]. *Dillenia suffruticosa* Martelli is also a common species in both 10- and 20-year-old secondary forests [14].

In 20-year-old secondary forest, 3 families were categorized as scarce families (Myrtaceae, Sapotaceae and Dilleniaceae) and extremely families (Ampelidaceae, Bombacaceae and Celastraceae). The remaining 22 families were classified as very scarce (Table 4).

Table 4. Scarcity of seedling and sapling families (DBH < 5 cm) in terms of genus, species, and number of individuals in 1 ha of 20-year-old secondary forest.

No.	Family	No. of family (ha^{-1})	No. of genera (ha^{-1})		No. of species (ha^{-1})		No. of individuals (ha^{-1})		Category
			Total	%	Total	%	Total	%	
1	Myrtaceae	1	1	1.16	2	1.89	71	3.02	*
2	Sapotaceae	1	1	1.16	2	1.89	181	7.70	*
3	Dilleniaceae	1	1	1.16	3	2.83	162	6.89	*
4	Chrysobalanaceae	1	1	1.16	1	0.94	2	0.09	**
5	Dipterocarpaceae	1	1	1.16	1	0.94	2	0.09	**
6	Connaraceae	1	1	1.16	1	0.94	3	0.13	**
7	Erythroxylaceae	1	1	1.16	1	0.94	3	0.13	**
8	Ixonanthaceae	1	1	1.16	1	0.94	3	0.13	**
9	Myrsinaceae	1	1	1.16	1	0.94	3	0.13	**
10	Actinidiaceae	1	1	1.16	1	0.94	4	0.17	**
11	Rutaceae	1	1	1.16	1	0.94	5	0.21	**
12	Verbenaceae	1	1	1.16	1	0.94	5	0.21	**
13	Rosaceae	1	1	1.16	1	0.94	6	0.26	**
14	Simaroubaceae	1	1	1.16	1	0.94	9	0.38	**
15	Fagaceae	1	1	1.16	1	0.94	10	0.43	**
16	Proteaceae	1	1	1.16	1	0.94	10	0.43	**
17	Aquifoliaceae	1	1	1.16	1	0.94	12	0.51	**
18	Lecythidaceae	1	1	1.16	1	0.94	15	0.64	**
19	Ebenaceae	1	1	1.16	1	0.94	16	0.68	**
20	Olacaceae	1	1	1.16	1	0.94	18	0.77	**
21	Elaeocarpaceae	1	1	1.16	1	0.94	20	0.85	**
22	Theaceae	1	1	1.16	1	0.94	22	0.94	**
23	Polygalaceae	1	1	1.16	1	0.94	30	1.28	**
24	Anisophylleaceae	1	1	1.16	1	0.94	32	1.36	**
25	Ulmaceae	1	1	1.16	1	0.94	36	1.53	**
26	Ampelidaceae	1	1	1.16	1	0.94	1	0.04	***
27	Bombacaceae	1	1	1.16	1	0.94	1	0.04	***
28	Celastraceae	1	1	1.16	1	0.94	1	0.04	***
	Total	28	28	32,56	32	30,19	683	29.04	
	Total per hectare	46	86	100.00	106	100.00	2352	100.00	
						Total	*		3
							**		22
							***		3

Note: * = Scarce family, ** = Very scarce family, *** = Extremely scarce family.

In a 20-year-old secondary forest, the most dominant type based on the number of individuals per hectare was Moraceae (688), Sapotaceae (181), and Sapindaceae (177) [15]. Furthermore, based on individual density, Theaceae, Moraceae, and Rhizoporaceae families were dominant in a 20-years-old secondary forest [12]. *Adinandra dumosa* (Theaceae) is a popular species at the 20-year-old secondary forest in terms of density, basal area, volume and Importance Value Index (IVi) [11].

Polygalaceae classified in the order Fabales (there are Fabaceae and two other small families in this order), called Quillajaceae and Surianaceae [17]. The total population of that species is only in a few numbers and only can be found in a wide area became the reason why those two plants are categorized as scarce [18].

The IUCN Red List of plants covers 42 species, eight of which are categorized as endangered: *Agave angustifolia, Artocarpus tamaran, Dracontomelon costatum, Durio dulcis, Durio kutejensis, Eusideroxylon zwageri, Myristica magnifica,* and *Shorea guiso*. These plants had an average IVI value of less than 10%, and their species abundance index was nearly zero. Commonly, the condition of the forest is included as moderate, where the diversity index value in each growth stage ranges from 1 to 3. Endangered, endemic, and protected plants have low IVI values for each species [16].

The scarceness of seedlings and saplings based on family, genera, species, and number of individuals was similar in Temuda I and Temuda II. At the same time, similar scarcity of families was observed between Belukar I and Belukar II. Apocynaceae and Dilleniaceae were categorized into scarce families in both Temuda I and Temuda II. In addition, Dilleniaceae was recorded as scarce in all study sites, whereas Lecythidaceae was recorded as a very scarce family in all four study sites. In both Temuda, seven families were included in very scarce families, for instance Actinidiaceae, Aquifoliaceae, Asteraceae, Elaeocarpaceae, Lecythidaceae, Myrsinaceae and Rhamnaceae. Two families, Symplocaceae and Proteaceae, were classified into very scarce families in Temuda I and extremely scarce families in Temuda II. Ixonanthaceae and Sterculiaceae were included in extremely scarce families in Temuda I. However, these two families were recorded as very scarce families in Temuda II. Asteraceae were observed as a very scarce family in Temuda I, Temuda II and Belukar I.

The similarity in family scarceness was represented by five very scarce families, including Aquifoliaceae, Lecythidaceae, Olacaceae, Simaroubaceae, and Ulmaceae in Belukar I and Belukar II. At both Belukar sites, Ampelidaceae was classified as an extremely scarce family. Anisophylleaceae, Rosaceae, Polygalaceae, Elaeocarpaceae and Ebenaceae were categorized to scarce families and very scarce families in Belukar I and II, respectively. Oxalidaceae and Dilleniaceae were also categorized to scarce families in Belukar I. The three scarce families in Belukar II were Myrsinaceae, Sapotaceae, and Dilleniaceae. On the other hand, Actinidiaceae and Myrsinaceae were classified into extremely scarce families in Belukar I, while in Belukar II these two families were classified to "very scarce". Ampelidaceae was included in a very scarce family in Belukar I, but it was categorized as an extremely scarce family in Belukar II. In Temuda II and Belukar II, Rosaceae were categorized as a very scarce family. This family was included as a scarce family in Belukar I. Ampelidaceae (in Temuda II and Belukar I) and Rutaceae (in Temuda II and Belukar II) were very scarce families. Elaeocarpaceae and Anisophylleaceae were classified into very scarce and scarce families in Temuda II and Belukar I, respectively.

Ebenaceae, Symplocaceae, and Rosaceae were classified as scarce families at the Gunung Raya Forest Reserve (GRFR) and Gunung Machinchang Forest Reserve (GMFR) on Langkawi Island according to the same scheme of family scarcity [19]. Four families were categorized as very scarce at these two sites: Tiliaceae, Lecythidaceae, Aquifolaceae, and Ixonanthaceae. Apocynaceae are very scarce in GRFR. Meanwhile, other families were very scarce in the GMFR forexample Ulmaceae, Rutaceae, and Rhizoporaceae.

The scarcity of tree species contributes to species richness and biodiversity in natural topical forests; however, extinction threatens them [20]. There are many factors that endanger some tree species, such as limited area distribution, uncommon habitat, decline in local abundance, or a combination of these factors [21]. The biotic, abiotic, and habitat conditions also cause scarcity of tree species [22]. Moreover, scarcity of plant species could occur because of factors such as (1) reduction of forest and environment, (2) reproductive obstacles of scarce plants, (3) human interference, and (4) animal disturbance [23].

The existence of scarce species depends on the condition of the ecosystem in the future, where it serves and contributes to species growth, although it can decrease or never increase. This uncertainty intensifies some actions that will protect biodiversity as a service provider and support protection incentives for more critical species [24]. Therefore, some actions are needed to protect scarce tree species, such as forest conservation for two species of *Taxus cuspidata* and *Torreya grandis* from the Taxaceae family, with the aim of reforestation in China. Attention is needed to fulfil the ecological requirements for nurseries, which can be achieved by creating a shady environment that improves the ecological quality of forest restoration [25].

4 Conclusion

Three classes were chosen to determine the level of scarce families of seedlings and saplings in secondary forests: scarce, very scarce, and extremely scarce families. The number of scarce families in secondary forests aged 5, 10, and 20 years was 22, 27, and 28, respectively.

The scarce families of seedlings and saplings play a very important role because their presence can influence stand structure, species composition, and plant diversity, although their number is very small in secondary forests. Therefore, some actions, such as conservation and reforestation, are needed to protect scarce species of seedlings and saplings. Information on scarce plant families in secondary forests is important for choosing plant species that require more attention in actions related to the management and rehabilitation of secondary forests for all age stages.

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