



Diversity Status and Sustainable Uses of Some Minor Forest Products in Ban Thung Soong Community Forest in Krabi Province, Thailand

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Abstract

The diversity status and sustainable uses of some Minor Forest Products in Ban Thung Soong Community Forest in Krabi Province were evaluated based on Important Value Index (IVI) analysis, utilizing method and quantitative ecological data based on local wisdom. The studies were found that at the highest level of 200-300 m altitude, the number of trees and total basal area was the highest than at level elevations of 0-100 m and 100-200 m from 12 stands (20x50 m²/stand). From IVI analysis, there were 65 species of plants found in Ban Thung Soong Community Forest (BTSCF). Analysis of IVI were found that the *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen shows the highest IVI with 22.37%. The highest percentage of relative density, relative frequencies and relative dominance were found in *Homalium undulatum* King with 7.50%, and 7.55% with *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen respectively. The numbers of species in BTSCF were 49±65 species ha⁻¹ and comprises of number of trees, saplings and seedlings ha⁻¹ were 4,697; 119,166 and 252,500 of trees ha⁻¹ respectively. There were 49 species categorized as Minor Forest Products (MFPs) which include medicinal plants, edible plants, and non-edible plants.

Keywords: Minor-forest products, Plant diversity, Sustainable uses, Community forestry, Important value index

1. Introduction

In Thailand, Minor Forest Products (MFPs) refer to all forest products other than timber, charcoal and fuelwood (Subansenee, 1994). MFPs are essential to the livelihood and well-being of Thai rural communities. In the past, MFPs received only modest attention from the Royal Forest Department (RFD), and the quantity and diversity has decreased for four reasons: adverse impact of deforestation and environmental degradation, over-exploitation, use of traditional, unimproved methods in harvesting and lack of information and inadequate training. Now, the direct and indirect values of MFPs are more clearly recognized and receiving interest from the government of Thailand.

The selection of Ban Thung Soong (BTS) as the study area was because BTS had good management of community forest and people were willing to conserve the sustainable resources of MFPs. BTS Community Forest is one of the good examples of community forestry management in the Southern provinces of Thailand. People in BTS not only conserve their community forest but also sustain forest resources without destroying or disturbing the natural resources. The study of MFPs was as indicators to determine the sustainable uses of forest resources in the natural habitat and indicate which species of MFPs were important and under threat. Through Important Value Index study, the importance of plant species indicates the dominant species that exist in the forest. Some MFPs were chosen based on the species composition in BTS Community Forest.

The important and sustainable uses of natural resources can improve the development of forest resources management. Through this study, the importance of MFPs in the natural habitat will help to improve rural peoples' awareness to sustain the uses of MFPs. The effort to conserve forest resources through community forestry management will sustain the composition of MFPs in the natural habitat. The traditional knowledge of local parataxonomist is also important to ensure the sustainable uses of MFPs for the future generation and research development will be continuous and improved. Therefore, this study was undertaken to determine the diversity status and sustainable uses of some MFPs in BTSCF and specifically to study MFPs that existed in natural habitats and were used by the villagers for their livelihood.

2. Research Materials and Methods

Field data were collected in Ban Thung Soong Community Forest (BTSCF) determined from three elevation levels at 0-100 m with three stands (20x50 m²/stand) of ten sample plots (10x10 m²/plot), at 100-200 m altitude with four stands and at 200-300 m altitude with five stands. Totally there were 12 stands selected for survey the plant species vegetation distribution in community forest area. All stands and all trees with DBH from 4.5 cm and height with 1.30 m above ground level in 20x50 m² (10 sample plots of 10x10 m²) were collected and measured in each stand. Saplings with height over 1.30 m above ground level but DBH less than 4.5 cm were measured and recorded in 4x4 m² plot. For seedling collection, plants with height lower than 1.30 m from ground level were measured and recorded in each 1x1 m².

2.1 Study area

The study was conducted in Ban Thung Soong Community Forest (BTSCF) in Krabi province. Krabi area is approximately 4,708.5 km² (2,942 820 rai) with about 336,210 people and population density is 71 in/km². Krabi is located 814 kilometers from Bangkok and between latitude 7°30' and 8°30' North and 98°30' and longitude 99°30' East with altitude about 6 m above sea level on land. The province consists of mountains, hills (solitary limestone hills, plains and mangrove forest, Rain Evergreen Forest, Dry Evergreen Forest, Beach Forest and Fresh Water Swamp Forest including more than 130 large and small islands. Recently, there are 66 Community Forest (CF) areas in Krabi Province, which are Muang Krabi (17 CF), Khao Phanom (11 CF), Ko Lanta (8 CF), Khlong Thom (7 CF), Ao Luek (12 CF), Plai Phraya (1 CF), Lam Thap (2 CF) and Nuea Khlong (8 CF).

BTS village was classify as a flat and hill terrain with the ground surface at the 30 to 350 m above Mean Sea Level (MSL). People in BTS village were conserved and protected Kuan Ying Wua Forest as Community Forest for 50 years. There are 12 stands (20x50 m²/10 stands) were established for study the plant species vegetation. The forest type of BTS Community Forest (Kuan Ying Wua Hill) was Tropical Moist Forest or Evergreen Forest.

2.2 Statistical Analysis

In this study, quantitative ecological methods were used such as the Important Value Index (IVI) to show the number of dominant plant species in community forest. The IVI analysis was used to determine the dominant and species composition in community forest as well as to indicate the diversity status and sustainable uses of MFPs among people in BTS. The IVI indicates the figure of ecological importance of a plant species (Curtis and McIntosh 1951; Risser and Rice 1971). According to Sukwong (1982), the IVI can be used to indicate the ecological succession of plant occupying the areas. The species that has high IVI is the dominant tree. It plays an important role in the community. Since each component value has a maximum value of 100, the IVI of any species in communities range between 0-300.

3. Results and discussion

3.1 Species composition

The number of trees in the previous and present studies in BTSCF including saplings and seedlings in stands (20x50 m²) (Table 1). In the previous research by Sawatdee (2002), there were 61 species of trees, 30 saplings and 31 seedlings and as comparison to the present study, the number of trees, saplings and seedlings were 65; 59 and 32 respectively were found in BTSCF. The different between previous and present studies was because of using different stands. In the previous study the stands were used 40x40 m² and the present study with 20x50 m². This study shows the differing from Sawatdee (2002) because the sizes, number of stands, and number of species are different. Compare to the others Moist Evergreen Forest in the Southern Provinces such as at Khao Chong, Trang, Khao Pra Taew, and Phuket had 150±22 species ha⁻¹ respectively (Kiratiprayoon, 1986). According to Glumphabutr (2004), the number of plant species in the Moist Evergreen Forest and Dry Evergreen Forest were 135 and 138 species respectively shows slightly higher than in the Hill Evergreen Forest with 129 species number. The study also indicates that the number of species at the high elevation at 200-300 m attitude was higher than at the lower elevation (0-100 m altitude).

From this study, the composition of species from the 12 stands (20x50 m²) indicates that at 0-100 m altitude, the numbers of trees were about 338 trees with 3 stands, at 100-200 m altitude were comprised of 478 trees with 4 stands and at level 200-300 m were consisted of 593 trees with 5 stands. The compositions of trees from the three altitude

levels are not much different. The number of trees, saplings and seedlings per ha in BTSCF are 4,697; 119,166 and 252,500 of trees ha⁻¹ respectively. Sawatdee (2002) indicates that the density of trees, saplings and seedlings per ha in BTSCF were 1,638 trees, 18,906 saplings and 141,251 seedlings.

According to Gardner *et al.* (2000), the common emergent trees in Tropical Moist Evergreen Forest were *Atrocarpus fraxinifolius*, *Hopea odorata* Roxb., *Dipterocarpus alatus* Roxb. ex G.Don, *Ficus* spp. and *Tetrameles nudiflora* R.Br. In BTSCF the emergent trees are including *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen, *Homalium undulatum* King, *Mangifera caloneura* Kurz, *Lithocarpus collettii* A. Camus, *Vatica stapfiana* (King) Slooten, and *Eurya acuminata* DC. var. *acuminata*. Glumpahabutr (2004) indicates that the dominant trees in Moist Evergreen Forest in Chantaburi Province consist of *Dipterocarpus alatus* Roxb. ex G.Don, *Anisoptera costata* Korth, *Sterculiaceae campanulata* Wal, *Hopea odorata* Roxb., *Irvingia malayana* Oliv. ex A. W.enn. and etc.

There are 36 families and 65 species comprised in BTSCF. The compositions of species were influenced by forest type in BTS which are Tropical Moist Evergreen Forest and some plants are native of Southern of Thailand, for example *Bouea oppositifolia* (Roxb.) Meisn., *Canarium denticulatum* Blume, *Prismatomeris* sp., *Bhesa indica* (Bedd.) Ding Hou, *Diospyros cauliflora* Blume, *Fagraea racemosa* Jack and *Cryptocarya ferea* Blume. The result shows that the BTSCF were consisted 42 species of trees, 9 species of shrub/trees, 7 species of shrub/shrubby trees and shrubs with 7 species. The highest numbers of trees were found in Euphorbiaceae which consisted of 5 species, 4 species of Dipterocarpaceae, 4 species of Moraceae, 3 species of Rubiaceae, Lauraceae, Leguminosae-Mimosoideae and Myrtaceae respectively.

There were 28 families with 49 species from 65 species founded in BTSCF were categories as MFPs. The highest MFPs families were Moraceae with 5 species, 3 species of Euphorbiaceae, Rubiaceae and Myrtaceae respectively. The medicinal plants show the highest composition with 23 families and 32 species were found in BTSCF. The medicinal plants were including *Bouea oppositifolia* (Roxb.) Meisn. *Mangifera caloneura* Kurz, *Diospyros cauliflora* Blume, *Cinnamomum iners* Reinw. ex Blume, *Schima wallichii* (DC.) Korth., and *Eurya acuminata* DC. var. *acuminata*. The result also indicates that there were 10 families and 13 species of MFPs were edible plants which can be use as food. The species such as *Bouea oppositifolia* (Roxb.) Meisn., *Cratoxylum maingayi* Dyer, *Azadirachta indica* A.Juss. var. *siamensis* Valetton, *Ficus hispida* L.f. and *Eurya acuminata* DC. var. *acuminata* were edible plants. Most of people use leaves, fruits, seeds, flowers, young shoots and sprouts as food.

The non-edible plants consist of ornamental plants, chemical components (exudates and extracts), non-industrial timber, fibers and leaves. There were 18 families and 22 species of non-edible plants namely *Diospyros cauliflora* Blume, *Diospyros undulata* Wall. ex G.Don var. *undulata*, *Aporosa villosa* (Wall. ex Lindl.) Baill., *Homalium undulatum* King, *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen, *Memecylon garcinioides* Blume, *Artocarpus* sp., *Cryptocarya ferea* Blume, *Vitex pinnata* L. and *Ixonanthes reticulata* Jack. The uses of wood from MFPs were defining only for non-industrial timber and own uses such as pole, house flooring, household tools, and etc. People in BTS use wood from *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen as pole, house flooring, and etc.

3.2 Species density

The density of tree ha⁻¹ with DBH ≥ 4.5 cm in were 4,697 trees ha⁻¹ with 65 species found in BTSCF. The densities of saplings were 119,166 saplings ha⁻¹ with 50 species and seedlings were consisted of 252,500 seedlings ha⁻¹ with 49 species. According to the study in BTSCF by Sawatdee (2002), the species density of trees with DBH ≥ 4.5 cm, saplings and seedlings were consisted of 1,638 trees ha⁻¹, 18,906 saplings ha⁻¹ and 141,251 seedlings ha⁻¹ respectively. As comparison, the density of trees in Moist Evergreen Forest and Dry Evergreen Forest in Chantaburi Province were consisted of 1,510 trees ha⁻¹ and 1,355 trees ha⁻¹ respectively which lower than in the Hill Evergreen Forest with 2,513 trees ha⁻¹ (Glumphabutr, 2004). The result shows that the density of trees with DBH ≥ 4.5 cm in BTSCF were higher than the Hill Evergreen Forest in Chantaburi Province. The density of trees was higher because of the composition of the small trees. The mean DBH for Hill Evergreen Forest trees was lower with 10.8 cm than Moist Evergreen Forest and Dry Evergreen Forest were 13.7 cm and 13.1 cm respectively. The average DBH of trees in BTSCF was 14.53 cm. The average diameter at breast height was determined the size of trees will influence the composition of species in the plot area.

3.3 Diameter at breast height and basal area

The distribution of tree species were categorized to three elevation levels from 0-100 m, 100-200 m and 200-300 m in BTSCF. The DBH ranges from 4.5 cm to 84.5 cm. The result shows that at the level 0-100 m altitude, the diameter classes from 4.5 cm to 9.5 cm were comprised the highest number of trees with 204 trees. The *Homalium undulatum* King consist the highest number of trees with 30 trees at DBH 4.5 to 9.5 cm. At 100-200 m altitude the diameter classes from 4.5 to 9.5 cm comprise the highest number of trees with 221 trees. In this altitude, the tree of *Homalium undulatum* King shows the highest number of trees with 39 trees at DBH classes 4.5 to 9.5 cm. The DBH of trees at 200-300 m altitude with the diameter classes from 4.5 to 9.5 cm comprise the highest number of trees with 294 trees, but the others diameter classes such as 9.5 to 54.5 cm also comprise moderate quantity of trees from 9 to 87 trees. In

this level the *Mangifera caloneura* Kurz consist the highest number of trees with 32 trees which followed by *Vatica stapfiana* (King) Slooten with 31 trees and 27 trees of *Madhuca kerrii* H.R.Fletcher at DBH classes 4.5 to 9.5 cm respectively.

The result indicates that at 0-100 m altitude, *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen and *Homalium undulatum* King comprise the highest total basal area with 0.6174 and 0.5147 m² respectively. The highest numbers of individual trees are *Homalium undulatum* King and *Schima wallichii* (DC.) Korth. with 44 trees respectively. At 100-200 m altitude, *Cratoxylum maingayi* Dyer and *Crypteronia paniculata* Blume indicates the highest total basal area about 1.3780 and 1.3474 m² with number of individual trees were 24 and 23 trees respectively. At 200-300 m altitude, the highest total basal area was found in *Lithocarpus collettii* A.Camus with 2.7500 m² had 32 trees and 1.8701 m² and 2.5524 m² for *Syzygium* sp. had 66 trees. The average basal area per plot from altitude levels at 0-100 m, 100-200 m and 200-300 m are 4.3707, 8.24805 and 8.6869 m² respectively. The average of basal area of trees at altitude 200-300 m is higher than the other levels because consist high number of larger trees. At altitude 0-100 m, most of trees are smaller and the number of trees is low with 338 trees.

Total basal area of the individual trees with DBH $\geq$ 4.5 cm according to three altitudes from 0-100 m, 100-200 m and 200-300 m shows that at 200-300 m altitude, the total basal area of trees is higher than the other levels about 19.4781 m². The total basal area and number of individual trees from three altitude levels are 38.8462 m² with 1,413 trees. The average basal area at altitude 0-100 m is lower than the other levels because the lowland area consist high number of saplings and seedlings. In the previous period, the lowland area is the secondary forest and people in BTS manage the lowland area with rehabilitation and restoration. Most of the trees which comprise high total basal area are found in *Homalium undulatum* King with 106 trees, 90 trees for *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen and 71 trees of *Vatica stapfiana* (King) Slooten are the dominant species in BTS Community Forest.

The average height of trees at altitude levels from 0-100 m, 100-200 m and 200-300 m are 14.2 m, 12 and 12.9 m respectively. The highest average height of trees are found in *Artocarpus* sp. with 21.5 m, 20 m height of *Vitex glabrata* R.Br., *Parkia speciosa* Hassk. and *Cryptocarya ferea* Blume respectively, *Carallia brachiata* (Lour.) Merr. with 19.7 m, 20 m for *Crypteronia paniculata* Blume and *Rhodamnia cinerea* Jack var. *cinerea* respectively and 18 m for *Archidendron clypearia* (Jack) I.C.Nielsen. Most of trees with the highest height appear at 0-100 m altitude are include *Artocarpus* sp. with 21.5 m, 20 m for *Vitex glabrata* R.Br. and *Carallia brachiata* (Lour.) Merr. with 19.7 m height. The highest trees height species appears at 100-200 m altitude are found in *Archidendron clypearia* (Jack) I.C.Nielsen with 16.3 m, *Symplocos cochinchinensis* (Lour.) S.Moore subsp. *cochinchinensis* with 16 m and 15 m for *Carallia brachiata* (Lour.) Merr. At altitude 200-300 m, the highest trees are found in *Parkia speciosa* Hassk. with 20 m, 19.3 m for *Cryptocarya ferea* Blume, 19 m for *Syzygium diospyrifolium* (Wall. ex Duthie) S.N.Mitra and 18 m for *Archidendron clypearia* (Jack) I.C. Nielsen).

3.4 Important Value Index

The Important Value Index (IVI) was used to indicates the dominant trees with DBH $\geq$ 4.5 cm in BTSCF. IVI is used to determine dominant trees in each stands (Wachrinrat, 2000; Glumphabutr, 2004). The *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen shows the highest IVI with 22.37% (Figure 1). The highest percentage of relative density is found in *Homalium undulatum* King with 7.50% and the lowest IVI is *Eurycoma longifolia* Jack with 0.14% with the lowest percentage of relative density about 0.07%. The lowest density is also found in other 5 tree species which include *Fagraea racemosa* Jack, *Symplocos cochinchinensis* (Lour.) S. Moore subsp. *cochinchinensis*, *Parkia speciosa* Hassk., *Gnetum gnemon* L. var. *tenerum* and *Eurycoma longifolia* Jack. The highest percentage of relative frequencies of tree is *Homalium undulatum* King with 7.55% and the lowest frequency are include *Eurycoma longifolia* Jack, *Fagraea racemosa* Jack and *Symplocos cochinchinensis* (Lour.) S. Moore subsp. *cochinchinensis*.

Most of the trees that have the lowest density show lower value percentage of relative frequency. The result shows that the density of trees is influenced by the frequency of the trees. The trees that have high frequency value will have regular scatter all the area which contain high density of plants. In this study, the percentage of relative density is 6.37% for *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen and the percentage of relative frequency is about 6.41%. The dominant species from the highest IVI value in BTSCF consist of *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen, *Homalium undulatum* King, *Mangifera caloneura* Kurz, *Vatica stapfiana* (King) Slooten and *Lithocarpus collettii* A.Camus.

The result also indicates that the IVI values of trees are related to IVI values of saplings. Most of the trees that have high IVI value such as *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen also comprise the high IVI value of saplings. The highest IVI saplings are found in *Euonymus javanicus* Blume with 27.19%, 18.30% for *Prismatomeris* sp., 13.44% for *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen and 10.31% for *Calophyllum polyanthum* Wall. ex Choisy. The result shows that the saplings of *Euonymus javanicus* Blume comprise the highest IVI value and grow well in BTSCF. As comparison to the previous research in the BTSCF by Sawatdee (2002), the highest IVI trees were found in *Schima wallichii* (DC.) Korth (58%), *Crypteronia paniculata* Blume (56%),

Memecylon lilacinum Zoll & Moritzi (26%), *Syzygium campanulatum* Korth. var. *campanulatum* (24%) and *Vitex pinnata* L. (20%). The highest IVI for saplings were founded in *Vatica* sp. with 35.43%, 26.26% of *Euonymus javanicus* Blume, 14.45% of *Ixonanthes reticulata* Jack, 14.1% of *Ardisia virens*, *Aporosa aurea*, and *Syzygium campanulatum* var. *campanulatum* (11.4%).

Pipatwattanukul (2002) also indicates that *Schima wallichii* (DC.) Korth was the highest IVI of trees and the highest IVI for saplings and seedlings were *Vatica* sp. In the Evergreen Forest of Eastern region of Thailand, the dominant trees with high IVI value are found in *Scaphium macropodium* Beaumee with 28%, 17% of *Archidendron guocense* (Pierre) Nielsen and 15 % of *Syzygium leneatum* (DC.) Merr. & L.M.Perry (Glumphabutr, 2004).

4. Conclusions

Ban Thung Soong Community Forest (BTSCF) comprised of 65 species of trees, 50 saplings and 49 seedlings. In stands (20x50 m²), the number of trees were 1,413 trees, 572 saplings and 303 seedlings. The three elevation levels of BTSCF at 0-100 m altitude, 100-200 m altitude and 200-300 m altitude comprised different numbers of trees, saplings and seedlings. There were 36 families with 65 species found in BTSCF. The highest level at 200-300 m had the highest numbers of trees and total basal area. For the Important Value Index (IVI), the dominant species in BTSCF were *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen, *Homalium undulatum* King, *Mangifera caloneura* Kurz, *Vatica stapfiana* (King) Slooten and *Lithocarpus collettii* A. Camus. The dominant saplings were *Euonymus javanicus* Blume, *Prismatomeris* sp., *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen, *Calophyllum ployanthum* Wall. ex Choisy and *Mangifera caloneura* Kurz.

There were 49 species categorized as Minor Forest Products (MFPs). The categories of MFPs were divided into three categories as medicinal plants, edible plants and non-edible plants. The dominant MFPs used as medicinal plants were as follows: *Azadirachta indica* A.Juss. var. *siamensis* Veleton, *Bouea oppositifolia* (Roxb.) Meisn. *Cratoxylum maingayi* Dyer, *Mangifera caloneura* Kurz, and *Schima wallichii* (DC.) Korth. The dominant edible plant species were *Azadirachta indica* A.Juss. var. *siamensis* Veleton, *Bouea oppositifolia* (Roxb.) Meisn., *Gnetum gnemon* L. var. *tenerum*, *Garcinia cowa* Roxb. ex DC, *Cratoxylum maingayi* Dyer and *Eurya acuminata* DC. var. *acuminata*, and non-edible plants consisted of *Aporosa villosa* (Wall. ex Lindl.) Baill., *Diospyros undulata* Wall. ex G.Don var. *undulata*, *Homalium undulatum* King and *Memecylon garcinoides* Blume. The results from IVI study not only provide information regarding MFPs composition in the forest but also indicate the levels of sustainable uses and resources of MFPs in BTS Community Forest among people in BTS. Some of the plants have low IVI but the frequency and quantity of harvesting is high which will affect the plant composition in the forest. The sustainable uses of MFPs through resource conservation in the natural forest will manage MFPs harvesting and collecting activity in the community forest. Some of the plants may be threatened because of the in lower composition or because of the higher frequency of harvesting which will affect the status of plants that occur in the forest. The sustainable resources of MFPs through distribution of MFPs in the natural forest and domestication in homesteads can improve the value of MFPs utilization. The awareness of people in BTS to ensure the sustainable management of the community forest should be continuous not only as a village program but also for future generation heritage.

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Table 1. Quantitative characteristics of trees, saplings and seedlings in Ban Thung Soong Community Forest

	Previous study (Sawatdee, 2002)			Present study in BTSCF		
Quantitative characteristics	T	S	Se	T	S	Se
Number of species	61	30	31	65	50	49
Number of trees (per plot)	524	121	113	1,413	572	303
Density of trees (per ha)	1,638	18,906	141,251	4,697	119,166	252,500
Basal area (per plot)	8.56	-	-	36.45	-	-
Percentage of basal area (%)	0.0856			0.3645		
Average DBH (cm) (per plot)				14.53		
Average height (m) (per plot)	12.5	4.06	4.01	13.75	3.43	0.24

Note: T = Trees, S = Saplings, Se = Seedlings

Table 1 shows the comparison on number of species on BTSCF in 2002 and present study. In the previous research by Sawatdee (2002), there were 61 species of trees, 30 saplings and 31 seedlings and as comparison to the present study, the number of trees, saplings and seedlings were 65; 59 and 32 respectively were found in BTSCF.

Figure 1 shows that the five main species of trees in BTSCF with the highest IVI value. The *Xylia xylocarpa* (Roxb.) Taub. var. *kerrii* (Craib & Hutch.) I.C.Nielsen was the highest IVI with 22.37% followed by *Homalium undulatum* King and *Mangifera caloneura* Kurz with 19.26% and 16.23% respectively.

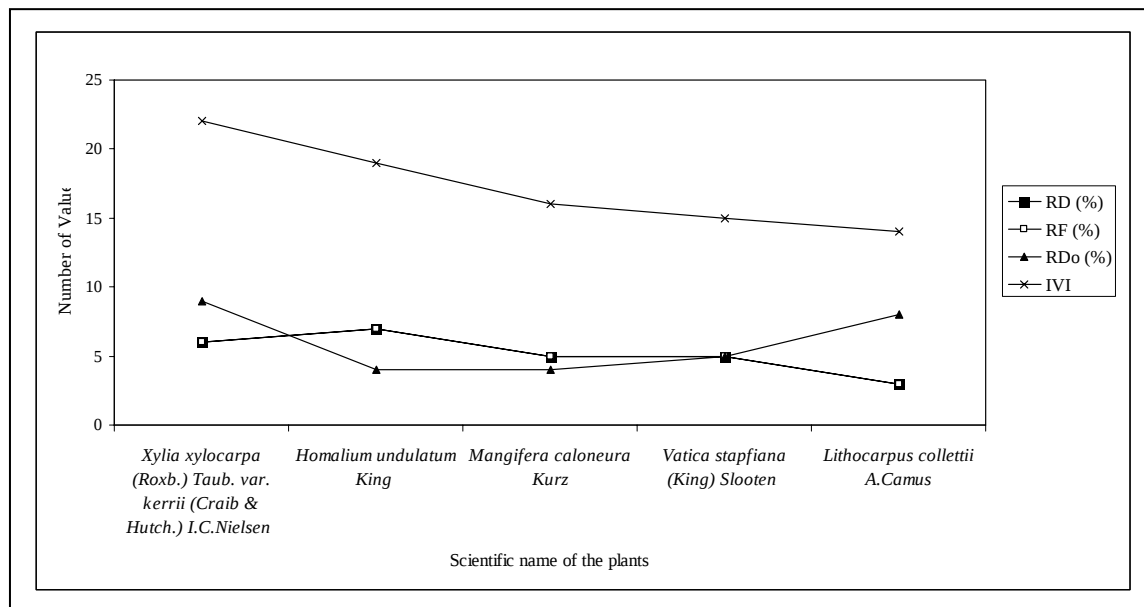


Figure 1. The highest IVI value for five species of trees with DBH ≥ 4.5 in Ban Thung Soong Community Forest