Influence of tree size on tree-related microhabitats in oak (*Quercus robur*)

A case study from eastern Scania, Sweden

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Träd-relaterade mikrohabitat hos ek (Quercus robur) i relation till trädstorleken

En fallstudie från östra Skåne

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Abstract

This study investigates the relationship between tree size, measured by diameter at breast height (dbh), and tree-related microhabitats (TreMs) in pedunculate oak (*Quercus robur*) in a forested area, Krubbemölla, outside Vitaby in Skåne, Sweden. TreMs offer a valuable method for assessing forest biodiversity without the need to track individual species. Oaks, being a keystone species, provide numerous ecological services, making them highly important in the ecological matrix. This research aims to broaden the understanding of the relationship between dbh and TreMs, hypothesizing that both the amount and variation of TreMs increase with dbh in oak trees.

The study area, Krubbemölla, encompasses 11.9 hectares of mixed-age forest stands, with species such as oak, alder, lime, bird cherry, beech, ash, and goat willow. The fieldwork involved measuring dbh and visually inspecting each tree for TreMs. Data was collected for all oaks in the study area with a dbh greater than 10 cm.

A total of 95 oaks were surveyed, and 403 TreMs were identified. Statistical analysis showed a significant positive correlation between dbh and the number of TreMs, indicating that larger trees host more TreMs. The variation in TreM types also increased with dbh, supporting the hypothesis. Specific TreMs, such as those suitable for beetles and slowly developing TreMs, also showed a positive relationship with dbh. The study confirms that older, larger trees are more likely to develop diverse TreMs, which aligns with existing literature on the subject.

The findings emphasize the importance of preserving old trees and large-diameter oaks, as they significantly contribute to forest biodiversity through the provision of various microhabitats. While dbh is a critical factor in TreM development, other elements like competition, site conditions, and natural disturbances also play roles in TreM formation. The results suggest that forest management practices should consider the preservation of large and old oaks to enhance biodiversity.

Keywords: Biodiversity, ecology, microhabitat, oak, TreMs

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Dbh	Diameter at breast height
TreM	Tree-related Microhabitat

1. Introduction

Forest ecosystems are major contributors to terrestrial biodiversity. More than 80 percent of terrestrial animals, insects and plants are dependent on forests for their survival (United Nations, 2023). Many of these species are associated with tropical rainforests, where biodiversity is substantially higher than elsewhere on earth. However, forests still remain as vital components for the ecosystems all around the globe. Sweden is a vastly forested country, about two thirds (68%) of the land area is covered by forests, which can also be seen in the forestry sector of the country. About 9-12% of the industry in Sweden is related to the forest sector, and much of the forest cover are monocultures of mainly spruce and pine. This means that most forests are used for production and thus there has been a decrease in old forests in Sweden during the last century, now only 10 percent of the productive forest land is considered old forests (Institutionen för skoglig resurshushållning, SLU Umeå, 2023). This has ecological implications, as the current forestry paradigm in Sweden favors the use of even-aged forest management to a large extent, and it has been shown that such forest management induces landscape fragmentation, degradation of ecosystems and the long-term consequences of biodiversity loss (Bruun & Heilmann-Clausen, 2021; Karlsson et. al, 2022). This highlights the need to address the ecological issues that are at hand and actions are needed in order to preserve and enhance biodiversity. A first step could be to monitor biodiversity values in order to get a grasp of the situation, although measuring biodiversity directly can be a large and daunting task, especially in a country as vast as Sweden. However, in recent years, tree-related microhabitats (hereafter TreMs) have begun to gain traction as a way to measure biodiversity in forests (Martin et al., 2022). Inventorying TreMs is a comprehensive approach to get an understanding of the biodiversity within a forest without having to trace singular organisms. Instead, the approach is about locating possible habitats for groups of species, which makes the work less intensive and time consuming than direct methods of measuring biodiversity.

Oaks (*Quercus spp.*) are known as a keystone species, meaning that they have a large impact on their communities by providing a variety of ecological services and functions (Eaton et al., 2016; Mölder et al., 2019). This makes oaks a species of special interest in the light of biodiversity issues, particularly in the context of biodiversity indicators such as TreMs. Furthermore, studies have shown that dbh has a substantial positive impact of TreM abundance in some species (Asbeck et al., 2019; 2021).

This study is carried out in order to get a better understanding of how TreMs are affected by tree size in penduncculate oak (*Quercus robur*). More specifically, the research question that this study is set out to answer is: what is the relationship between stem diameter at breast height (dbh) and TreMs? And the hypothesis is as follows: amount and variation of tree-related microhabitats increase with diameter at breast height (dbh) in oak (*Q. robur*).

2. Methods

2.1 Study area

Krubbemölla is a small forested area located outside Vitaby, Skåne, Sweden (figures 1-3). The word “mölla” in the name hints to what is the most prominent element of the area: the old water mill. The mill is still in use as an exhibition, operated by a rural association, which also takes care of the adjacent forest. Krubbemölla spans about 11.9 hectares and is mostly covered by forest and crop fields. The forest stands are of varying age and composition and species such as oak (*Q. robur*), black alder (*Alnus glutinosa*), lime (*Tilia spp.*), wild cherry (*Prunus avium*), beech (*Fagus sylvatica*), ash (*Fraxinus excelsior*) and goat willow (*Salix caprea*) form the tree canopy. The area is located in the midst of an agricultural landscape and some of the present forest stands of Krubbemölla are located on old agricultural soil. A dominant feature of the landscape in Krubbemölla is the creek that runs along it, from west to east it traverses through the estate. On the western parts of the estate, the creek runs in a gorge, which gradually opens up as it goes forward beyond the water mill (Appendix 1).

Figure 1. Location of Krubbemölla (red dot) in the context of southern Scania, Sweden (Lantmäteriet, 2024).

Figure 2. Picture of the study area facing west in subdivision 4 (see Fig. 4).

Figure 3. Picture of the creek in Krubbemölla, taken in the south of subdivision 4 (see Fig. 4) facing north.

2.2 Preparatory GIS work

At the start of the study, the study area was divided into subsections to make the fieldwork as comprehensive as possible, so the inventory could be methodologically carried out zone by zone. This was done due to a shortage of time before the trees would be leafing, making the inventory of TreMs significantly harder. The division of the subareas was done by using ArcGIS and was based on the forest cover of Krubbemölla during four different timestamps: 1929, 1961, 1975 and present day. First, the 1929 map was overlaid and fitted with geolocators onto a current satellite image. Then, polygons were drawn on the map according to the 1929 forest cover. The same process was also repeated for the 1961 and 1975 maps, as well as the current satellite image. After this, age classifications of the Krubbemölla forest could be assumed based on the forest cover of each timestamp and these age classifications were the basis for deciding the subdivisions. The subdivisions were thus roughly based on stand age.

Figure 4. Map showing the study area and its subdivisions which were roughly based on age, created for a comprehensive TreM inventory process. Specific stand age is not available.

2.3 TreM classification

For identifying TreMs, the Field guide to Tree-related Microhabitats (Bütler et. al, 2020) was used, which contains classifications, thresholds and information on how to identify TreMs. The Field guide is based upon the hierarchical TreM typology compiled by Larrieu et al. (2018). The main forms of TreMs and the distinct TreM types belonging to each form can be seen in Table 1 below.

Table 1. List of seven main TreM forms and distinct TreM types within each form.

Cavities	Small/medium/large woodpecker breeding cavities, woodpecker flute, trunk base rot-hole, trunk rot-hole, semi-open trunk rot-hole, chimney trunk-base rot-hole, chimney trunk rot-hole without ground contact, hollow branch, insect galleries and bore holes, denrotelm, woodpecker foraging excavation, bark-lined trunk concavity, buttress root-concavity
Tree injuries and exposed wood	Bark loss, fire scar, bark shelter, bark pocket, stem breakage, limb breakage, crack, lightning scar, fork split at intersection,
Crown deadwood	Dead branches, dead top
Excrescences	Witches broom, epicormic shoots, burr, canker
Fruiting bodies of saproxylic fungi and slime moulds	Perennial polypore, annual polypore, pulpy agaric, large pyrenomycete, myxomycetes
Epiphytic and epixylic structures	Bryophytes, foliose and fruticose lichens, ivy and lianas, ferns, mistletoe, vertebrate nest, invertebrate nest, bark microsoil, crown microsoil
Exudates	Sap run, heavy resinosis

In the Field guide, there are also classifications regarding development rates for all TreM types (Bütler et al., 2020). The development rates are categorized as either slow, fairly slow, fairly rapid or rapid. However, for this study the slow and fairly slow has been merged as “slow” and fairly rapid and rapid has been merged together as “rapid”. The classifications of TreM development rates can be seen in Table 2.

Table 2. List of slowly and rapidly developing TreMs.

Slow	Woodpecker flute, trunk-base rot-hole, trunk rot-hole, semi-open trunk rot-hole, chimney trunk-base rot-hole, chimney trunk rot-hole without ground contact, hollow branch, dendrotelm, bark-lined trunk concavity, buttress root concavity, fire scar, bark shelter, bark pocket, crack, lightning scar, fork split at intersection, dead branches, dead top, epicormic shoots, burr, canker, perennial polypore, annual polypore, pulpy agaric, large pyrenomycete, foliose and fruticose lichens, ferns, invertebrate nest, bark microsoil, crown microsoil, sap run
Rapid	Small/medium/large woodpecker breeding cavities, hollow branch, insect galleries and bore holes, woodpecker foraging excavation, bark loss, fire scar, stem breakage, limb breakage, remnants of a broken limb, witches broom, myxomycetes, bryophytes, ivy and lianas, mistletoe, vertebrate nest, heavy resinosis

In Table 3, all TreM types that are associated with beetles (Coleoptera) are listed.

Table 3. List of TreM types associated with beetles (Coleoptera).

TreMs associated with Coleoptera	Small/medium/large woodpecker breeding cavities, woodpecker flute, trunk-base rot-hole, trunk rot-hole, semi-open trunk rot-hole, chimney trunk-base rot-hole, chimney trunk rot-hole with no ground contact, hollow branch, insect galleries and bore holes, dendrotelm, woodpecker foraging excavation, bark loss, fire scar, bark pocket, stem breakage, limb breakage, dead branches, dead top, remnants of a broken limb, perennial polypore, annual polypore, pulpy agaric, large pyyrenomycete, myxomycetes, bryophytes, foliose and fructose lichens, ivy and lianas, mistletoe, vertebrate nest, invertebrate nest, sap run

2.4 Fieldwork

The fieldwork was carried out together with another student who wrote a thesis of a similar nature to this study. To get the correct borders for the subdivisions, the app “Min karta" from Lantmäteriet (the Swedish land survey authority) was used, where the subdivisions could be imported and seen in real time with a GPS tracker.

The borders of the subdivisions were physically marked with strings of varying colors, to separate them from each other. All oaks with >10 cm dbh in the study area were subject to being measured and inspected for TreMs. The measurements were then carried out in the subdivisions, one after another. First, a visual inspection of the trees was needed to ensure that the tree was an oak. The fieldwork was carried out in late March and early April, and thus there were no leaves present on the trees. Tree identification had to be carried out by looking at the bark and most importantly the shoots, which there was a manual for, with sample pictures to ensure a credible species identification. If the tree was identified as an oak, it was tagged with coordinates in the “Min karta” app. Dbh measurements were then done. In cases where the dbh was >50 cm, a measuring tape was used instead due to the caliper being too small. When using the measuring tape, the circumference was measured, which then was divided with pi in order to obtain the diameter of the tree. After the dbh had been acquired, the visual inspection for TreMs on the tree began. To identify TreMs, the Field guide to Tree-related Microhabitats (Bütler et. al, 2020) was used. The handbook has instructions regarding thresholds for TreMs, for example minimum size of a buttress or amount of epicormic shoot clusters for it to be accounted for in the study. The inspection always started from the trunk of the tree, then going upwards. Initially, this was often done in close proximity to the stem, and after inspecting it from a close distance, it was also inspected from some distance, about 10-15 meters, in order to ensure no TreMs were missed. In some instances, binoculars were used to get a better view of the crowns and high parts of the tree.

When the tree had been inspected, all identified TreMs were registered in the "Min karta" app, together with the coordinates and dbh of the tree. For some TreMs, such as root concavities and holes, which can look similar, a process in which the end of the caliper was used to sense if the floor of the concavity or rot hole was soft, or bark-lined and hard, and thus the determination of the right kind of TreM could be made. Regarding cankers and burrs, which can look similar, a knife was used in order to feel if the wood was rotting or not. In some cases, there were trees which had multiple stems. If the tree was forked under breast height, it was counted as two separate trees, and if it was forked over breast height, it was counted as one. This process was then repeated in each subdivision of the 11,9 hectares of Krubbemölla, except for area 6, which was not inventoried due to a shortage of time.

2.5 Data processing

The acquired data about TreMs which was stored in the "Min karta" app was manually put into Excel worksheets. Total amount and variation of different TreM types, dbh and coordinates for each sampled tree were registered in the worksheet. Additionally, all TreMs were also registered according to their group in the Field guide to Tree-related Microhabitats (Bütler et. al, 2020). In order to create the graphs, Minitab was used. In Minitab, the excel worksheet with all TreM data was imported. All graphs were created by using the regression analysis function to create fitted line plots in Minitab. The program thus generated values such as P-value and coefficient of determination (R-sq adj in the graphs). The highest possible coefficient of determination was desirable in the graphs to get an accurate representation of the data. Thus, linear, quadratic and cubic models were generated for each graph and the model which had the highest coefficient of determination was chosen to be included in this study. A bar chart with information about dbh frequency was also created using Excel.

3. Results

A total of 95 oaks were inventoried within the study area. The amount of trees in 10 cm dbh classes can be seen in Figure 5.

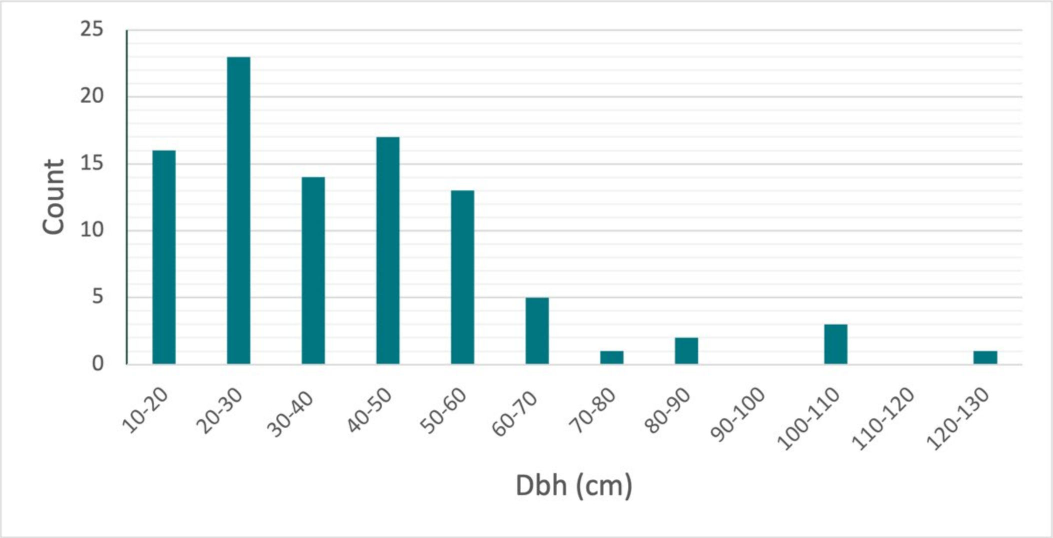

Figure 5. Bar chart depicting the frequency of trees with their corresponding stem diameter at breast height in size intervals of 10 cm.

In total, 403 individual TreMs were identified, with crown deadwood being the most commonly occurring form, and exudates the rarest (Table 2).

Table 4. List of amount of inventoried TreMs in each form.

TreM form	**Total number of observations**
Cavities	22
Tree injuries and exposed wood	33
Crown deadwood	276
Excrescences	40
Fruiting bodies of saproxylic fungi and slime moulds	8
Epiphytic and epixylic structures	21
Exudates	3
Total	403

All regressions had a P-value below 0.001, which indicates a highly statistically significant relation of the tested variables with dbh.

In Figure 6, the relationship between total number of individual TreMs in a tree and its dbh can be seen, with dbh having an overall positive influence on amount of TreMs. The largest inventoried oak had a substantial amount of TreMs, which is shown throughout all gathered data for this study.

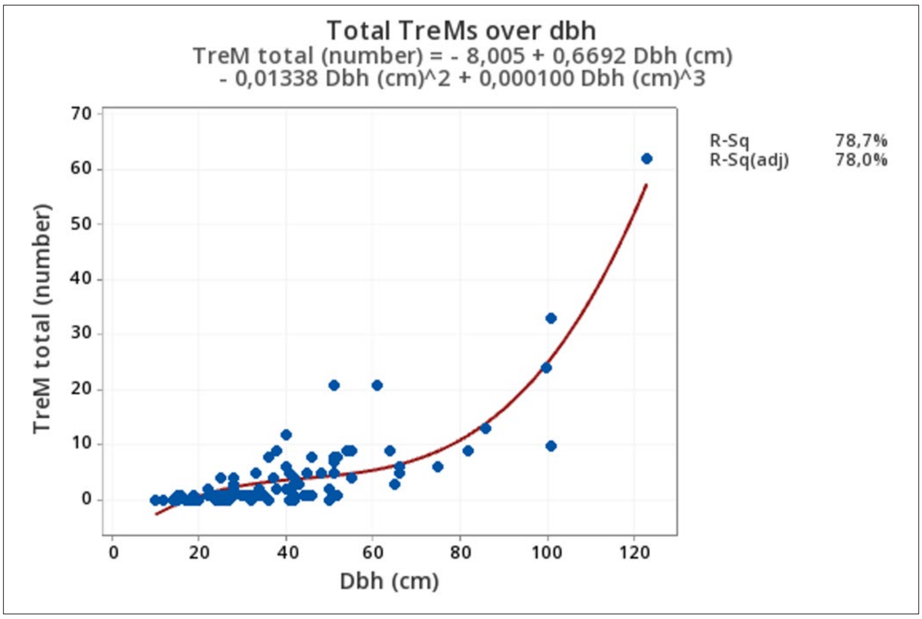

Figure 6. Polynomial regression of the total amount of TreMs in a specific tree against stem diameter of oaks in the study area (F-value: 112.20; P-value: <0.001).

The variation (diversity) of different TreM types in a tree can be seen in Figure 7. Variation means the observations of different TreM types in a single tree. Based on the graph, there is a positive relation between TreM type variation and tree dbh.

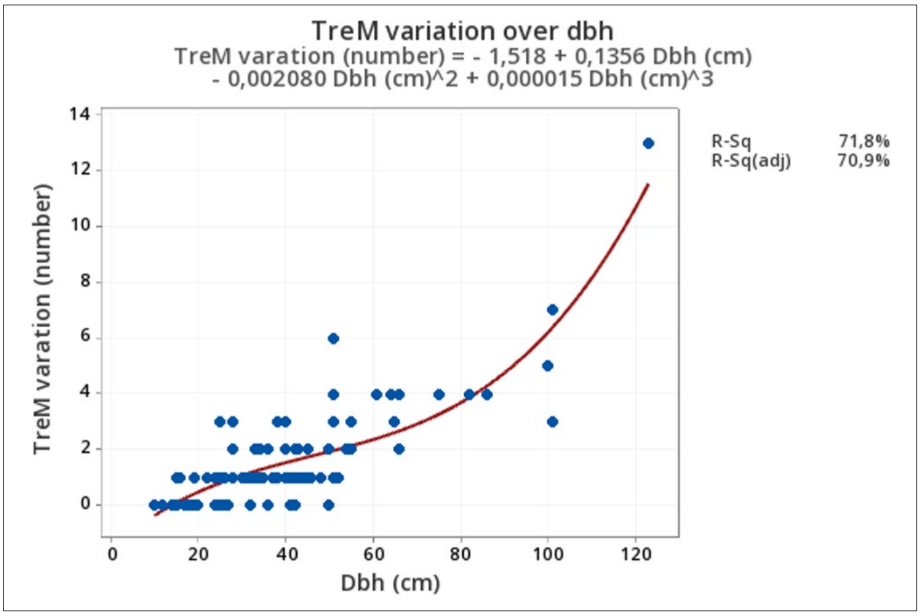

Figure 7. Polynomial regression of the variation of TreM types against stem diameter of oaks in the study area (F-value: 77.16; P-value: <0.001).

Crown deadwood was the most commonly occurring TreM form. In Figure 8, the relationship between crown deadwood and dbh is highlighted. The graph highlights that dbh has a positive impact on the TreM form crown deadwood.

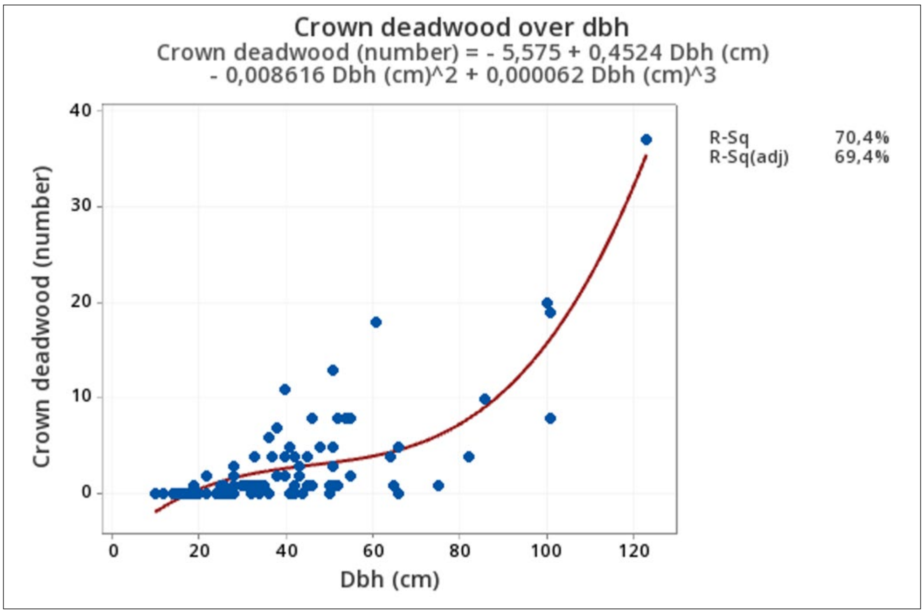

Figure 8. Polynomial regression showing the amount of crown deadwood against stem diameter of oaks in the study area (F-value: 72.14; P-value: <0.001).

Figure 9 depicts the occurrence of TreMs that are suitable for beetles (Coleoptera) and its relation to dbh. There is a general increase of TreMs suitable for Coleoptera with stem diameter, however a rise can be observed in the mid-section of the graph.

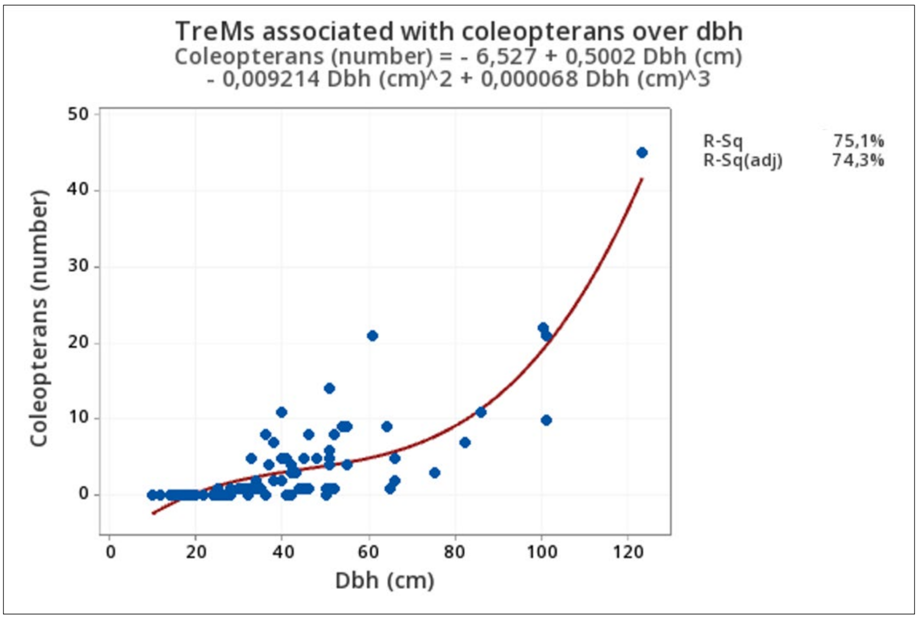

Figure 9. Polynomial regression showing the amount of TreMs associated with Coleoptera against stem diameter of oaks in the study area (F-value: 91.58 ; P-value: <0.001).

In Figure 10, the relation between slowly developing TreMs and dbh is highlighted. Based on the graph, dbh has a positive impact on slowly developing TreMs.

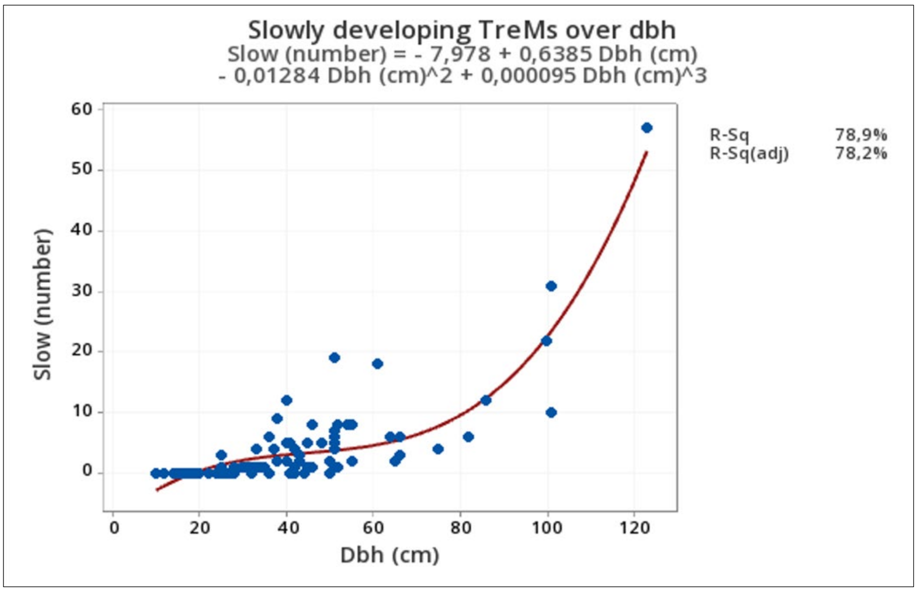

Figure 10. Polynomial regression showing the amount of slowly developing TreMs against stem diameter of oaks in the study area (F-value: 113.23 ; P-value: <0.001).

4. Discussion

The results of this study show that there is a strong positive correlation between TreM abundance and variation and tree size. This is in line with other studies that found that dbh has a positive impact of TreM development (Larrieu, 2022; Vuidot et al., 2011; Asbeck et al., 2021). In the data for this paper, there is a high occurrence of TreMs in oaks with a large stem diameter (Figure 6), which most probably also were older than the smaller sampled trees. This supports what other studies have shown on the subject, namely that old trees in their senescent stage are more prone to develop TreMs (Kozák et al., 2023). This can also be observed in Figure 10, which shows the relationship between dbh and slowly developing TreMs. One possible explanation to why senescent trees develop many TreMs is that it could be due to the wood softening by rot fungi in some cases. An example of this are woodpeckers that use softened wood to create their breeding cavities and foraging excavations with more ease, which over time can become TreMs suitable for other organisms than just woodpeckers (Vuidot et al., 2011).

As can be seen in Figure 6, there are two sampled trees between dbh 40 – 60 that have a higher amount of TreMs than other trees of the same size. This highlights that dbh is not the sole determinator for TreM amount and variation, but instead other factors can influence this, such competition from nearby trees or abiotic factors (Mölder et al., 2019; Vuidot et al., 2011). Factors such as natural disturbances could also influence TreM formation heavily, and old trees which have stood for a longer time have a higher chance for experiencing these disturbances (Vuidot et al., 2011; Kozák et al., 2023). An example of abiotic factors that can affect the amount of TreMs is altitude, which can be explained by rougher climatic conditions and disturbances such as falling rocks from mountain slopes, which has been shown to have an impact on TreM occurrence (Asbeck et al., 2019; 2021).

Some parts of the study area were previously agricultural fields with fertile soil. More specifically, this is the case in the northern parts of area 5 and 7 (Figure 4). There were many young oaks present in these areas, most had few TreMs, in contrast to the large, old oaks present in area 4 and south-east in area 5 (Figure 4). This could be due to the fact that the large, old oaks in area 4 and south-east area of 5 have grown for a long time with little competition, enabling them to spread their crowns and grow large. However, as the agricultural fields were abandoned and other trees started growing there instead, crown competition affected the large old oaks, as oak is a light demanding species (Eaton et al., 2016). This could have led to the high amount of dead branches that was found on the old trees. The largest oak (123 cm dbh) had 37 dead branches that qualified in accordance with the thresholds set for dead branch TreMs by Larrieu et al. (2018), which can be seen in Figure 8. In contrast, the young oaks in the northern parts of area 5 and 7 had relatively few TreMs, which could be due to them growing with competition from the start, but also due to the fact that young trees are more vital, and thus have developed fewer TreMs. Stand openness has been shown to be a factor that influences TreM formation, this is particularly the case for TreMs associated with oak-associated beetles (Widerberg et al., 2012). In that study, Widerberg and colleagues draw the conclusion that an increased stand openness around retained oaks is a positively influencing factor on oak-associated beetles, especially when in a south-facing direction. This could be related to TreMs, as one can see that there is a general rise for beetle-related TreMs over dbh (Figure 9). The largest oaks in this study were located in area 4 (Figure 4) and in that particular stand, thinnings of the brush and competing vegetation had recently been carried out, resulting in a more open stand compared with the other stands of Krubbemölla,. Thus, this measure follows the management recommendation by Widerberg et al. (2012), hopefully for the benefit of the saproxylic beetle fauna.

In Figure 7, TreM variation is shown. According to the data, dbh has a positive relationship with TreM variation, and this is in line with what other studies have concluded, which observed a rise in TreM variation with dbh and tree age (e.g. Kozák et al., 2023). The relationship between dbh and TreM variation follows the same pattern as dbh and TreM amount.

4.1 Limitations and errors

Possible errors during the sampling is that, even though we were two persons doing the inventory, there is always some degree of subjectiveness. For example, a canker or burr found up high on a stem can be hard to distinguish, as it was not possible to cut it to see if the wood was rotten. Another possible error is that no measurements were taken on TreMs, e.g. woodpecker breeding cavities that come in three sizes: small, large and medium. An assessment then had to be made about which size the hole was, which is subjective to some degree.

A more standardized tree inspection method such as set distances that the tree would be inspected from would also have been beneficial, in order to ensure as much objectivity in the assessment as possible. Finally, the inventory would also have benefitted from starting earlier in the season, as leaves had begun to break during the final days of the fieldwork, limiting the possibility to identify all TreMs, especially in the tree crowns. However, fieldwork during the fall would also have been beneficial, as it would have been possible to identify some specific TreMs such as annual polypores with more ease.

5. Conclusions

Based on the results of this study, dbh seems to have a strong and positive correlation with occurrence of TreMs. Crown deadwood, specifically dead branches, was the most represented type of TreM found in this study, with the largest oaks having the most dead branches as well. Furthermore, large, old oaks are important for TreMs that develop slowly, which highlights the need for forest managers to preserve and enhance these key trees. However, there are also indications and other studies that have shown that other factors, such as site conditions are important as well when it comes to the development of TreMs, but dbh seems to be the dominant factor in TreM formation and occurrence. Further studies are needed to get a broader understanding of TreM dynamics and how they are affected by stand structure and composition.

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Appendix 1

Subdivisions of Krubbemölla

All areas (subdivisions) can be seen in Figure 1.

Area 1 is split into two parts, however both parts have in common that they are dominated by large trees of old age. Dominating species are alder (*Alnus spp.*), goat willow (*S. caprea*), oak (*Q. robur*), ash (*Fraxinus spp.*) and wild cherry (*Prunus avium*). One part of the section is located at the bottom of a slope/hill, which makes the area quite water-saturated in the soil; one sank down slightly in the soil for each step taken on the ground. The other part is located at the top of the slope; water availability and water saturation in the soil was considerably lower. In the area, a peculiar orchid was also found, early purple orchid (*Orchis mascula*).

Area 2 is dominated by a gorge which has a creek running at its lowest point. Dominating tree species are maple (*Acer spp.*), common hazel (*Corylus avellana*), ash (*Fraxinus spp.*), european beech (*F. sylvatica*), cherry (*Prunus spp.*) and oak (*Q. robur*). The section is characterized by a mixture of old, large trees such as oaks similar to the oldest ones found in area 4 and 1, and smaller trees in the middle of the area, many of whom did not even qualify for the study in terms of dbh. The area is surrounded by open fields and many fallen elm and ash-trees can be found in it.

Area 3 is the easternmost part of the study area. The dominating tree species are Alder (*Alnus spp.*), oak (*Q. robur)*, Lime (*Tilia spp.*), and Ash (*Fraxinus spp.*). It is characterized by having two streams running on each side of an island. One of the streams is related to an old water mill and is thus man-made and most often the flood gates are closed, which makes the man-made stream low in water content and speed/flow. The other stream is natural and has a higher water content and flow speed. Some of the trees in this area were found on the island, however, the section continues to the east after the island ends and the streams join together again. Continuing a bit after this joint stream intersection, we found trees on both sides of the stream, mostly alder (*Alnus spp.*), but also lime trees (*Tilia spp.*), hazel (*C. avellana*), oak (*Q. robur*) and ash (*Fraxinus spp.*) were found in the area.

Area 4 is an area that is dominated by large, old oaks (*Q. robur)*, alder (*Alnus spp.*) and with some elements of goat willow (*S. caprea*). The foundation that manages the site had previously cleared the young forest and bush wood in the parts of the section to frame and promote the large oaks. The impression after these thinnings of young trees and bush wood is that you are being in a pillar hall made up from old, large oaks. The ground in the section is fine and saturated with water, especially in the western parts of the section. The section also has a stream running through it in its south-western part, and there are alder trees by the stream. Furthermore, some parts of the western section were covered with quite heavy bush wood. On the ground there were bryophytes, shoots from various tree species and a substantial amount of wood anemone (*Anemone nemorosa*). Furthermore, the section is located right next to the old watermill and has some tables and benches spread out, which makes the area popular for recreational activities.

Area 5 is an area which is dominated by damp and water saturated soil in its middle, south and western parts, where alder (*Alnus spp.*), goat willow (*S. caprea*), and bird cherry (*P. padus*) In the northern parts of the section, which is located on a slope and this higher in elevation, we found mostly young oaks (*Q. robur*) and many ash (*Fraxinus spp.*) shoots coming up from the ground. In the middle/south-east area of the section, there is a large swamp and bush wood-type of growth where no trees of substantial size could be found.

Area 7 is located at the top of the hill which causes the damp and water saturated soil of areas 4 and 5. The subdivision is dominated by ash (*Fraxinus spp.*), wild cherry (*P. avium*) and oak (*Q. robur*). The area is relatively dry compared to the other areas, however it is adjacent to a farm field to the north, which is also a hill that slopes toward area 7. So it sits in between two slopes, but it is relatively dry compared to other areas of Krubbemölla. This could be due to the stream that runs along the north border of area 7, marking the border between the farm field and the forest. The forest is dominated by oaks, bird cherries and hazel. Small quantities of beech and hornbeam were also found in the section. Young trees of size <10 cm DBH were very prevalent in the middle parts of the section. On the ground, additional early purple orchid (*Orchis mascula*) is found.

Area 6, which can be seen on the map, was not inventoried.

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