

A METHOD FOR ESTABLISHING SMALL  
PERMANENT SAMPLE PLOTS FOR ECOLOGICAL  
STUDIES

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*SELOSTUS:*

*MENETELMÄ PYSYVIEN NÄTTEALOJEN PERUSTAMISEKSI  
EKOLOGISIA TUTKIMUKSIA VARTEN*

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### A method for establishing small permanent sample plots for ecological studies

Many research subjects call for sample plots that are small in area. Phenomena of succession, brought about by forest fire, burning-over, grazing, fertilizing, draining of swamps, lowering the surface levels of water courses etc. will serve as examples. But above all this kind of sample plot is needed in experimental ecological research. It must be stressed that this method, consisting of several consecutive inventories, will give an inexpensive and valuable aid to research — time. Although the utility of permanent sample plots is generally appreciated, the number of studies based on them is extremely small, as e.g. OOSTING (1956) points out. On top of this the material is often scanty, at least with regard to



Fig. 1. A circular frame placed in position by means of the marker-skewer. An *Anemone nemorosa* association. Photo Ilkka Pukkila.

Kuva 1. Kehikko asetettuna merkkipuikon varaan *Anemone nemorosa*-kasvustossa. Valok. Ilkka Pukkila.

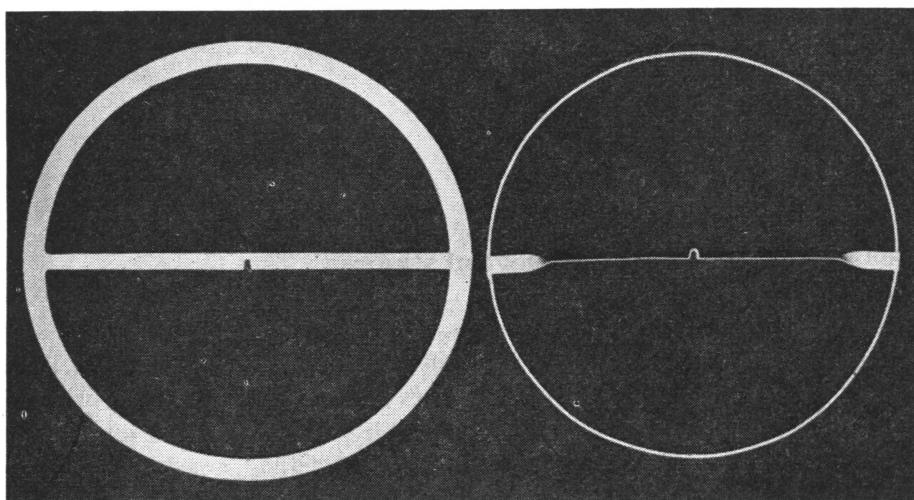


Fig. 2. Two frames of a later design.  
 Kuva 2. Pari kehikon myöhempää mallia.

more demanding statistical treatment. There must, of course, be reasons for this state of affairs. One of these is obviously the fact that few research workers can afford such a long period of time as this method presupposes. It is understandable, therefore, that they pursue other methods. It may be pointed out, on the other hand, that there are several research institutes, the programs of which should include investigations based on permanent sample plots. Obviously there must be other reasons for the scarcity of this kind of investigation. Perhaps one of these reasons is that a suitable method has not been found, whereby it would be possible to establish and make repeated inventories of such permanent sample plots to the extent required for statistical treatment — a method which would, at the same time, ensure the permanence of these plots.

The ecological literature (cf. GATES 1949, BRAUN—BLANQUET 1951, OOSTING 1956) abounds in examples as to how permanent sample plots can be established and inventories repeatedly made. The most usual way, perhaps, is to mark out quadrangular sample plots on the terrain by placing wooden or metal stakes at their corners. These corner stakes often mark the sample plot accurately enough for observations to be made. A quadrangular frame can be used, however, as an aid in marking out a sample plot. Another procedure is to mark only the central point of the sample plot; for making observations the plot is delineated by means of a fixed radius. The sample plot can also be delineated by means of natural boundaries, such as boulders, stumps and trees. Repeated observations are noted in a table or on a map or the area is photographed at different times. A combination of these methods is often resorted to.

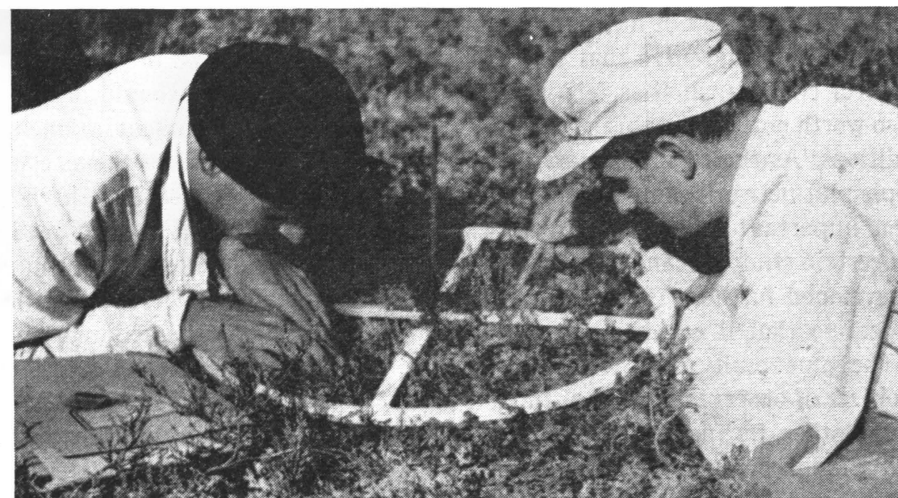


Fig. 3. Observers counting young pine seedlings in a sample plot.  
 Photo Paavo Yli-Vakkuri.

Kuva 3. Havaintojen tekijät lukemassa näytealalle nousseita männyn sirkkataimia.  
 Valok. Paavo Yli-Vakkuri.

The author developed a method on these lines in spring 1956 when making an experimental study of the natural reproduction of forests. In this method, too, the central points of the sample plots were marked with iron skewers. But the marking of the area was accomplished by means of a circular frame. In its centre there was an aperture in which the skewer indicating the central point of the sample plot was fitted (see fig. 1). The area of the frame was relatively small, 0.25 square meters. When using a larger frame it was noticed that the counting of small seedlings, which calls for considerable care, could not be done with sufficient accuracy. The frames employed were made of a suitable material such as plywood, hardboard or metal and each time designed a little differently in an effort to find the best model (see fig. 2). The frame has been used frequently during a period of three years and has given most satisfactory results. With it sample plots can be marked repeatedly, rapidly and very accurately. On determining plant coverages and making other observations it has proved to be more advantageous to know the circumference of the sample plot than to use only the radius (see fig. 3).

Depending on circumstances, 10—20 repetitions have been used in each series of observations. The sample plots representing different experimental series have been arbitrarily placed at intervals from one another. The skewers used as markers, 5/16" in diameter and 60 cm long, have usually been placed at a distance of 2—3 meters from one another. When this distance is used, the observers, who often lie outstretched on the ground, do not damage the adjacent

sample plots. The use of metallic skewers and number plates for marking sample plots seems to guarantee that the observation network will be preserved even if radical changes, such as fellings, grazing, burning-over etc. should occur. It is also worth noting that this method of marking does not effect the environmental conditions. As the required material can be made before going to the site, the sample plot network can be established without delay. In some studies this may be an important factor. Moreover, when the equipment is no longer needed for a certain study, it can be utilized for other studies. The method can, of course, be developed further. The frame can be a folding one. It can be fitted with a compass so that it can be anchored accurately to facilitate repeated mappings etc. The same result can be achieved, of course, by using two skewers to determine the object of observation; one of them is placed at the central point of the frame and the other, for instance, fitted in a notch in the rim of the frame. Thus with two markingskewers or with one skewer and a compass we can already determine the position of a quadrangular frame too. A larger frame can be used, of course, if required.

In plant ecological and plant sociological studies a great many observations continue to be made on the basis of single inventories. One of the aims of the author for reporting the method referred to above, has been to draw research workers' attention to the fact that this kind of observation can be made — by using the right method — so as to make it possible to carry out repeated inventories in the same places. It would make research work considerably more effective. There is an abundance of suitable research subjects which are well worth the trouble. In view of the fact that the forest site types of CAJANDER (1909) will be 50 years old next year, the importance of permanent objects of observation may be emphasized by a relevant example. CAJANDER defined forest site types in their normal state, i.e. such as they appear in regularly developed forests when the stands are exploitable and of normal density. But he stressed, too (cf. CAJANDER 1949), that it is important also to describe the nature of those accidental changes that different factors cause in the normal picture of forest site types. A great deal of valuable research work has been carried out in this respect by Finnish scientists. But so far out forest site types have not been uniformly described even as regards the different stages of normal series in accordance with the age of the stand, not to mention the fact that the accidental changes, which fellings, forest fires or burnings-over, and grazing etc. cause in these series, have not been sufficiently elucidated. When taking into consideration the significance of forest site types in Finnish forestry and forest research, the above mentioned gaps are a serious matter. These can hardly be filled by comparative studies alone. Material based on repeated inventories is also required.

### Kirjallisuusluettelo

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### SELOSTUS:

#### MENETELMÄ PYSYVIEN NÄYTEALOJEN PERUSTAMISEKSI EKOLOGISIA TUTKIMUKSIA VARTEN

Artikkelissa selostetaan tekijän vuonna 1956 kehittämää menetelmää perustaa ja jatkuvasti inventoida pysyviä pienialaisia näytealoja. Olennaista menetelmässä on se, että yhdellä rautapuikolla pysyvästi merkittyjen näytealojen toistuvaan rajoittamiseen käytetään siirrettävää, ympyränmuotoista kehikkoa (ks. kuvat 1, 2, 3), jonka keskipisteessä on lovi merkkipuikkoa varten. Menetelmää on tähän mennessä hyvin tuloksin käytetty mm. männyn ja kuusen luontaisen uudistumisen selvittelyyn sekä tutkittaessa aluskasvillisuuden muutoksia kulotuksen ja hakkuiden vaikutuksesta. Olosuhteista riippuen on kussakin havaintosarjassa ollut 10—20 toistoa. Näytealat on sijoitettu arvannon perusteella toistensa lomiin.