

NEW SNOW GLIDING ELEMENT FROM BAVARIA

"SCHNEEFIX TRIO" A GOOD ALTERNATIVE TO THE TRIPOD STAND

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INTRODUCTION

In Bavaria / Germany departments of protection forest reforestation take care to restore the protection forests in the Alpine region. They plan the necessary measures which can ensure that degraded protection forests can again fulfill their protection functions.

In high mountains various defense works against snow gliding are used to protect young forest plants against snow movements. Usually tripod stands, as known from Switzerland, are used which are made of durable wood. Such defense works are necessary especially in opened up forests and open fields at slopes between 30° and 50°, otherwise the snow breaks or uproots the young trees.

In 2004 / 5 the staff of the Bavarian Forest Service developed a new element. It was tested from the Bavarian State Institute of Forestry (LWF). The new construction element (VE) is named "Schneefix Trio" (Fig. 1) and consists of three 2-meter-long timbers, which are bolted together in the form of an equilateral triangle. The element is secured with steel cables to an anchor. The anchor is drilled into the bedrock and filled with mortar. It was the objective of the research project to test the new VE for its suitability in the field and compare it with two other products on the market.

TEST AREA AND EXPERIMENTAL DESIGN

The sample area was established within a restoration region in the Bavarian Alps near the village of Wildbad Kreuth and was suitable for the comparison because of similar conditions. In addition to the 30 "Trios", 30 tripod stands made of wood and 30 "Snow Gripper" (Fig. 1) made of aluminum, a new development from Austria, were established. The structures were then placed in a 4x4 meter grid. The test area has an average slope of 41 ° and is located at 1,000 m above sea level. The maximum snow depth in winter is 1 to 2 meters.

STUDY OBJECTIVES

The following investigations were carried out:

- **Time studies** related to construction, transport (Helicopter) and establishment of the "Trio"
- **Cost analysis** of the "Trio"
- **Cost comparison** with the other construction elements
- **Stability test** of the "Trio" anchor
- **Snow gliding measurements** at the three different construction elements

METHODOLOGY

Part of the work (the construction and establishment of the "Trio") was carried out by the staff of the LWF which was necessary in order to conduct the time studies. Other work, such as the construction of the anchor, tripod stands and the "Snow Gripper" structures were carried out by contractors. The stability test of the anchors was restricted to the 30 Trio anchor. They were tested with 20 kN tensile loading. The snow gliding measurements in 2008/2009 were conducted on all construction elements at six different positions.

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Fig. 1 Snow gliding construction elements: „Schneefix Trio“ on the left, „Snowgripper“ on the right

RESULTS

The protection against snow gliding given by the element “Trio” is comparable to that of a tripod stand and it is easy and inexpensive to manufacture. The decisive factors are firmly fixed anchors which must withstand a load of up to 3.2 tons.

Tab. 1 Drag forces on anchors used for the element “Trio” under extreme conditions (2,5 m depth of the snow, $\rho = 400 \text{ kg/m}^3$)

<i>Distance between the elements of „Trio“</i>	<i>Slope 30° Drag forces</i>	<i>Slope 40° Drag forces</i>	<i>Slope 50° Drag forces</i>
4 x 4 m	16 kN	23 kN	32 kN
5 x 5 m	22 kN	32 kN	45 kN

Keywords: snow gliding, construction elements, protection forest restoration