

Manual Cutting Tool for use in Grafting

This invention relates to a manual cutting tool for use in grafting, for instance in viniculture, aboriculture and horticulture.

Several devices have been developed for grafting in
5 viniculture, aboriculture and horticulture. HU-PS 179 082 and DE-OS 26 02 316 specify such types. These devices contain a cutting element which is able to produce an incision in the understock with one single cut, respectively, and it becomes possible to cut the grafts in predetermined identical shapes. Most frequently
10 the knives are formed so as to enable the grafting of a greek omega-profile. However, knives are also known, by the aid of which grafting in a U-Shaped profile is also possible.

Said devices have considerably increased the productivity of grafting compared with the omega-profile knives. However, the
15 results were far from satisfactory since grafts made with said devices either did not take at all but if taken were only half-sided. The reason for this is that the stream of juice being of utmost importance for the plants, begins only when there is a complete matching of the understock and the graft. Complete
20 matching can be hindered even by faults seemingly otherwise quite insignificant, such as for example harming of the grafts in the course of grafting. Unfortunately the cutting knives presently in use tend to harm the grafts in addition to shearing; the grafts are elastically deformed and bent. Due to deformation and bending the
25 graft will be destroyed and the shape of the graft will be inaccurate.

Thus, it is an object of the invention to develop a manual cutting tool for grafting by the aid of which grafting can be performed without harming or destruction of the graft, with

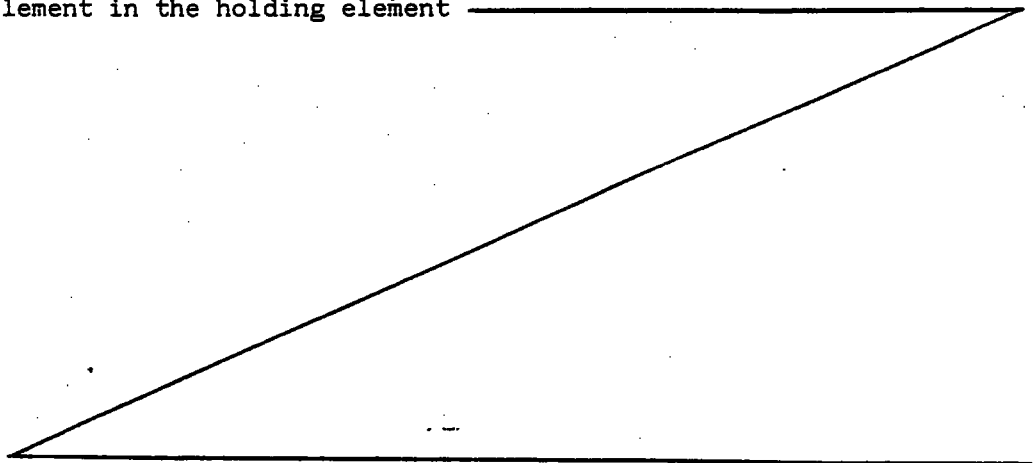
accurately formed shapes and which will allow time savings in the cutting and grafting procedure.

Although pure shearing could be obtained by having the cutting edge in the cutting direction, the change in the grinding angle in
5 the course of grinding must be also considered.

Accordingly, the invention relates to a manual cutting tool for use in grafting, including a cutting element with a curved cutting surface, the cutting surface having an inner surface and a corresponding outer surface, and a locating element manually movable
10 in the cutting direction against the cutting element, wherein the inner surface is inclined with respect to the cutting direction by an angle in the range 0.5 to 3° and the outer surface is inclined with respect to the cutting direction by an angle in the range 0.75 to 5° .

15 In an advantageous embodiment the free end of the cutting surface (the end towards the handles) is inclined by an angle in the range from 10 to 45° with respect to the cutting direction.

In a further advantageous embodiment of the proposed cutting tool, flanges of the cutting element are fixed in a holding element
20 between parallel planar parts and the thickness of the cutting element in the holding element



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is greater than its thickness at its cutting edge. The cutting element is advantageously arranged symmetrically about a plane lying perpendicular of the parallel planar parts of the holding elements.

5 When grafting the grafts with the cutting element shaped according to the invention a substantially pure shearing process is taking place. This possibility is yielded by angle β previously mentioned. The stub cut has a substantially faultless, and well-shaped surface.
10 The tool can be used for preparing all kinds of graft, for example those for vine, fruit or ornamental shrubbery and grafts may be prepared indoors in winter, in the spring on the spot and in addition to these green-grafting or propagation by cutting are possible.

15 A preferred embodiment of the invention is described by way of example, with reference to the drawings, wherein:

Figure 1 is a side view of a cutting tool according to the invention,

20 Figure 2 shows a first cross-section A-A through the device of Figure 1,

Figure 3 shows a second cross-section B-B through the device of Figure 1, and

25 Figure 4 shows a third cross-section C-C through the device of Figure 1.

As shown in Figure 1 a cutting tool according to this invention has first and second longitudinal members, 7, 5, having a common pivot 8. On one side of the pivot the longitudinal members are curved to serve as handles, 30 which may have any conventional shape. Between the curved portion of the first member 7 and the pivot 8

there is an off-set portion with a rounded projecting piece housing the pivot 8, the offset portion extending in the form of a straight guide portion 4, on the other side of the projecting piece. The end of the guide
5 portion 4 remote from the pivot is bent over perpendicularly to form a holder 2 for a cutting element 1 having a cutting surface.

A pin is located in a bore in the projecting piece to serve as the pivot. The second member 5 can be
10 angularly moved about the pivot 8 relative to the first member 7. The second member 5 extends from the pivot 8 at an angle to the handle thereof and the end of this extension remote from the pivot 8 is round and clevis-shaped and houses a bore through which a pin passes for
15 connecting an end of an arm 6 to the extension. A spring has one end attached to the first member 7 where the curved handle portion meets the off-set portion and the other end attached to pin 9. Movement of the second member about pivot 8 thus induces to-and-fro movement
20 of the arm 6 against the spring.

Along the whole length of the guide portion 4 there is a groove for guiding a movable locating element 3, fixed to the end of the arm 6 remote from the pin 9, by means of a further pin (not shown). The locating element
25 3 has a cut-away surface in each side at the end remote from arm 6 and an interior recess.

On each side of the locating element 3 there is an L-shaped piece 11 for separating an understock and the pieces of plant cut out by the cutting element, having two
30 parallel spaced apart flanges which are fixed to the holder 2 of the first member 7 by means of screws. The

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cross-section of the cutting element is shown in the further figures.

The movable second member 5 can be kept in a fixed, closed position by using a conventional protection plate which abuts part of the projection in the closed position.

As it can be seen in Figure 3 or 4, the cutting element 1 is bent into a U-shaped form. Obviously it can instead be shaped in the form of the greek letter omega or otherwise. The cutting surface has an inner and an outer side. The surface is ground in the cutting direction, shown in Figure 2.

The flanges of the cutting element 1 are placed between parallel planar parts of respectively, a holding element 10 and the holder 2. The spacing of the parts is V_r in the holding element and its value is at least as great as the maximum thickness V_v of the material of the cutting element 1 (Figure 2). In this way the significant shearing and torsion stresses arising during cutting in the fixing part, in the holding element 10 of the cutting element 1 can be avoided. These stresses would be able to easily break the holding element 10 which is weakened by the bores and narrowed parts. As a consequence it is advantageous to maintain the original thickness of the element in the holding element 10 as shown in Figure 4. Practically it means that thickness V_r should correspond to at least the greatest thickness V_v of the cutting element 1.

The cross-section of the cutting element 1 in the cutting direction i is shown in Figure 2. The inner side of the cutting element 1 subtends an angle ϕ from

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the cutting direction i, while the outer side subtends an angle α_1 from the cutting direction. Expediently the angle β lies in the range from 0.5 to 3° and the angle α_1 in the range from 0.75 to 5° . Lower angles
5 produce thicker and stiffer grafts, while the higher ones produce thinner and more flexible grafts.

The scion is bent away from the cutting element but becomes deformed; accordingly the angle of declination of the grinding angle is compensated too. It is
10 expedient to grind down the surface at the free end nearest the handles and contiguous with the outer side of the cutting element so the free end angle α_2 from the cutting direction which is in the approximate range from 10 to 45° . With lower angles
15 the knife would become quickly worn, while with angles higher than 45° the graft would be harmed. The width s of the free end surface should preferably not exceed 2mm , unless difficulties in cutting and harming of the grafts are not required to be avoided. The cutting tool may
20 be operated as follows:

On releasing the protective plate, the spring acts to pull the arm 6 to the left in the drawing i.e. towards the handles and the movable second member 5 moves away from the first member 7. As a consequence of this
25 movement of the spring, the clevis-shaped element holding the locating element 3 is guided together with the locating element 3 by the groove towards the handles.

The understock is then placed in the space between the depressed locating element 3 and the cutting element
30 1, and over the cut-away surface of the locating element 3. At the same time, the second member 5 is manually



pushed back towards the first member 7 against the force of the spring and the spring then returns the arm 6, the clevis-shaped element and locating element 3 towards the cutting element 1, and the U-shaped cutting edge of the blade cuts off a graft as desired. By repeatedly opening and closing the first and second members 5, 7 the L-shaped pieces 11 help to take the understock off the blade. The graft is removed by means of the locating element 3.

10 Operation of the device requires a force of approximately 40 N, and so it can be manually operated without difficulty.

15 Scions cut using the tool according to this invention can be accurately grafted and the procedure is much more efficient than that involving the use of the conventional tools.

20 The tool can be used for preparing all kinds of graft, for example those for vine, fruit or ornamental shrubbery and grafts may be prepared indoors in winter, in the spring on the spot and in addition to these greengrafting or propagation by cutting are possible.

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CLAIMS

1. A manual cutting tool for use in grafting, including a cutting element with a curved cutting surface, the cutting surface having an inner surface and a corresponding outer surface, and a locating element manually movable in the cutting direction against the cutting element, wherein the inner surface is inclined with respect to the cutting direction an an angle in the range 0.5 to 3° and the outer surface is inclined with respect to the cutting direction by an angle in the range 0.75 to 5°.
2. A manual cutting tool according to claim 1, wherein the free end of the cutting surface towards the handles is inclined by an angle in the range from 10 to 45° with respect to the cutting direction.
3. A manual cutting tool according to claim 2, wherein the width of the said free end of the cutting surface is less than 2 mm.
4. A manual cutting tool according to any one of claims 1 to 3, wherein the end parts of the cutting element are fixed in a holding element between parallel planar parts and the thickness of the cutting element in the holding element is at least as great as its thickness at its cutting edge.
5. A manual cutting tool according to claim 4, wherein the cutting element is arranged symmetrically to a plane lying perpendicular to the parallel planar parts of the holding element.
6. A manual cutting tool for use in grafting, constructed and arranged substantially as herein described with reference to the drawings.