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Problem solving in everyday life: On methods and tools for weeding (or removing weeds)

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Abstract

"Weeding" (or removing weeds) is a labor work which has been performed since ancient days, and hence a large variety of tools and machines have been developed. However it is still a heavy burden of labor at home, at farms, in parks, in town, etc. How can we reduce the burden of weeding? This problem appears small and simple at first sight, but it is actually big and difficult. The difficulty stems from the fact that the problem situations are quite different (especially depending on the climates and culture in different countries/regions). What is the purpose (i.e., what types of results one wants), at what kind of place/ground, what kinds of weeds/grass are growing, what kinds of useful plants are there, etc. How can we classify the methods of weeding (i.e., cutting/pulling/removing/etc. weeds)? How should we classify the tools? On the basis of consideration from these viewpoints, we have built up the guidelines where in various situations (of purposes, places, types of weeds, etc.) we recommend the types of methods and types of tools/machines to be applied. One of the concluding recommendations is 'cutting the weeds just below the ground surface' rather than 'cutting the weeds above the ground' or 'pulling the weeds out'.

Keywords: defining a problem; purpose-goal-method; method-tool-mechanism; methods of removing weed

1. Introduction and defining the problem of 'Removing weeds'

This paper is based on a thesis work for a Bachelor degree by Miyake, whose family operates a gardening business. The present topic was chosen as a common problem in everyday life.

Even though the problem appears small and simple, it actually extends so widely in quite different situations that we should understand and define the problem within a broader perspective. We realize that we need to view and classify the problem situations from multiple viewpoints, e.g.:

- Purposes: To prepare for planting crops, to remove weeds obstructing the growth of the crops, etc.
- Goals: To remove the obstructing parts of weeds above the ground, to remove/cut the weeds just above the ground, to remove the weeds by the roots, to remove the deep roots as well, etc.

Differences also arise from various usage of the place, different conditions of the ground, different kinds of weeds, variety in extension of roots, different distribution patterns of crops and weeds (See Fig. 1), etc. [Note: This paper illustrates the importance of problem definition in TRIZ before solving it.]

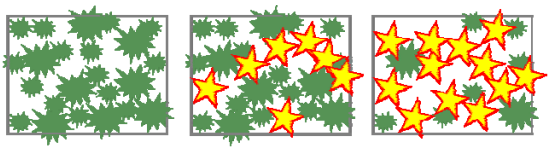

Fig. 1. Different distributions of crops (stars) and weeds.

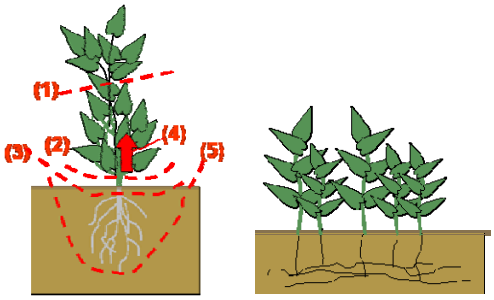

Fig. 2 Where to attack the weeds ?

2. Methods and tools for removing weeds

Methods for removing weeds can be classified best by the parts of the plant we are going to attack/remove (See Fig. 2): i.e., To remove/cut upper parts of the weeds, to remove/cut/pull the parts of weeds just above the ground, to remove/cut the parts of weeds just below the grounds, to remove the weeds by the root by pulling or digging the ground, to dig in the ground and turn over the whole plant and ground together, etc. A variety of tools have been developed, having different aims in usage, different principles/ mechanisms, and styles of usage.

3. Guidelines for selecting the methods/tools of removing weeds

Based on these considerations, we have chosen to define the problem in the relations of "Purpose - Goal - Method". Then we further classified the current solutions in relations of "Method - Tool - Principle/mechanism - Usage -Evaluation", and the methods evaluated (relatively) highly are summarized in Fig. 3. The present work is a demonstration of how to think of vaguely defined familiar problems.

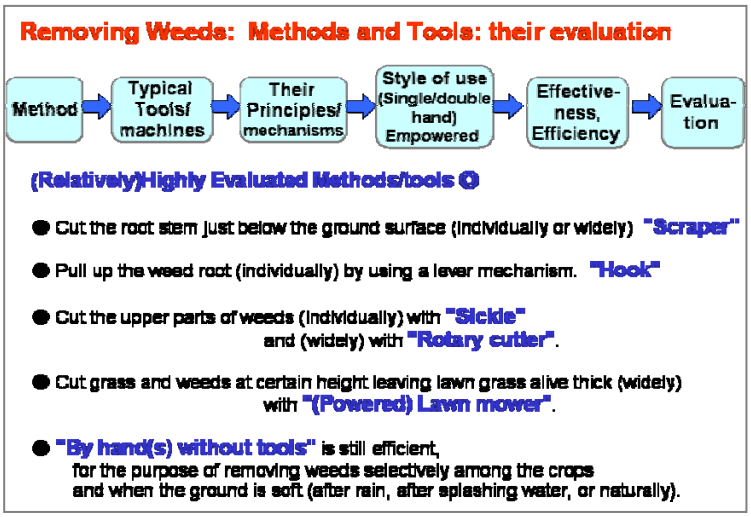

Fig. 3. Methods and tools for removing weeds.