

Steam Weeding Technique with Excellent Weed-Controlling Effect and Usability Is Finally Available

The Railway Technical Research Institute (RTRI) finally completed the development of a steam weeding technique using a steam weeding equipment (Fig. 1) which efficiently withers weeds with steam. The equipment has newly developed handheld nozzles combined with a general-purpose steam cleaner. Efficient use of this steam weeding technique enables effective weed control, with less time and fewer workers required for weeding work, and with the number of annual cleaning work reduced due to delayed weed regrowth, as compared to conventional weeding technique using the bush cutter.

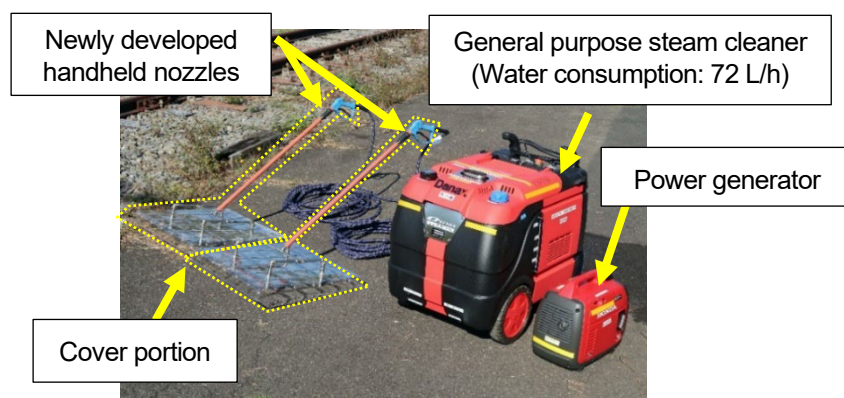


Fig. 1 Steam Weeding Equipment

1. Background of Development

For weeding work in railway field, bush cutters are widely used. This method involves issues such that, especially in summertime, weeds grow rapidly after weeding work, and that vibration of bush cutters causes vibration-induced upper limb disorder and, as a countermeasure against such a disorder, the time used for weed removal must be shortened. Further, as signaling and communication cables are installed on railway field, great care must be taken to avoid cutting those cables while at work.

As a result, development of weeding technique with excellent weed-controlling effect and usability has been sought after.

2. Summary of Steam Weeding Technique

Steam weeding, a method of withering weeds to death from steam heat, does not harm surrounding environment because it uses only water. The method has ever been used in agricultural fields and required large boilers and as much as approximately 1,000 liters of water per hour. Since there were challenges in obtaining large amount of water on railway right of way, we have developed a steam weeding technique using a steam cleaner combined with handheld nozzles.

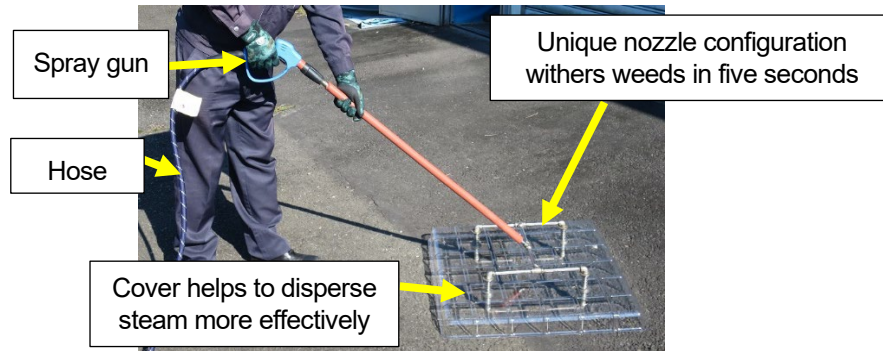


Fig. 2 Configuration of newly invented handheld nozzles

A general-purpose steam cleaner is adopted for this equipment. Consumption of water are reduced to 72 liter per hour (two nozzles are simultaneously used), less than one-tenth of that used for previous examples in agricultural fields. A cover portion is installed where steam heat is provided to weeds. The cover portion has a structure which retains steam inside. By operating the handheld nozzles (Fig. 2), the steam is sent to the cover portion.

- Five-second steam injection per one use can wither weeds growing within the range of the cover portion (area of approximately 0.5 square meters).
- Steam heat affects only the inside of the cover portion. Handheld portion of the nozzles will not get hot.
- Since handheld nozzles do not vibrate, no time limit is required for weeding work.
- No preliminary countermeasures against cable-cutting incidents, including cable inspection and curing, are required in advance.
- As removed weeds wither on the spot, waste collection is not required and no waste is generated during weeding work.
- For one steam cleaner, up to two nozzles can be installed. A nozzle weighs approximately four kilograms and can be handled by one worker.
- The estimation performed by a standard example of weed-removal work per 300 square meters resulted in that the conventional weeding using the bush cutter required working time of 72 minutes, three bush cutters, and five workers, while the newly developed technique required working time of 50 minutes, two nozzles, and three workers, that is, 30% reduction of working time and 40% reduction of required workers.
- In a field test performed in the location where large weeds were growing, in the conventional weeding using the bush cutter, weeds regrew in approximately 80% of the coverage area and blossoming was also observed about three months after the weed removal, while in the steam weeding technique, weeds regrew in as low as approximately 10% of the coverage area and no blossoming was observed about three months after the weed removal. In addition, in the area where the steam weeding technique was conducted, the number of regrowing large weeds was reduced by 70% one year after the removal, as compared to the area where the conventional weed removal was performed (Fig. 3).

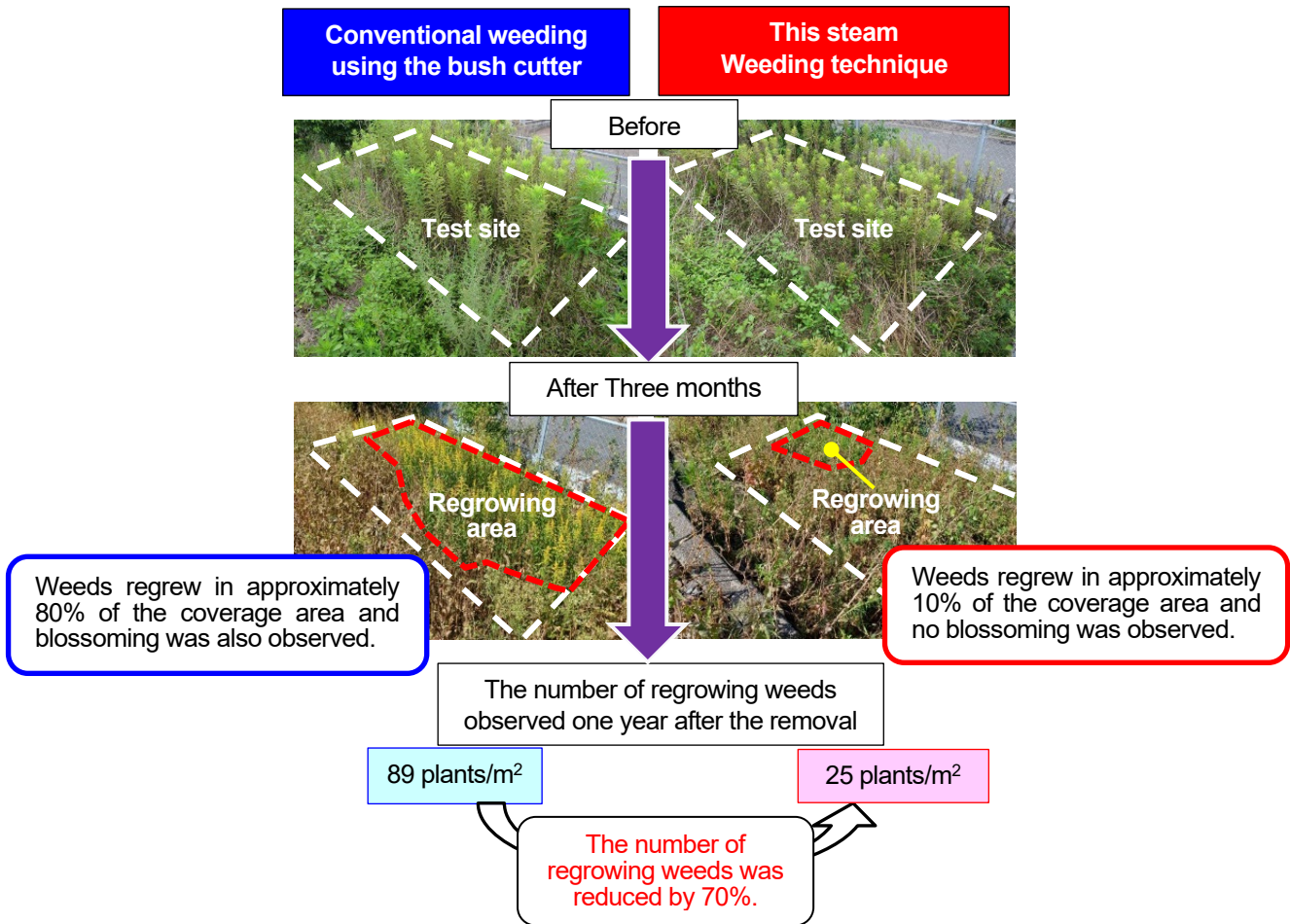


Fig. 3 Comparison of Weed-Controlling Effect Observed in a Field Test

3. Miscellaneous

A patent is pending for the developed handheld nozzles (Japanese Patent Application Laid-Open Publication No. 2023-114432) and a design has been registered for the cover portion (Registration No. 1739886).

The steam weeding equipment used for this technique are now distributed by Nippon-Kranzle Co., Ltd.