Evaluation of sustainable weeding methods for the control of spontaneous flora in urban areas

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European directive 2009/128/CEE

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National action plan for the sustainable use of pesticides (***PAN***)

Introduction: Spontaneous flora can be a problem in urban environments and green spaces. Following the current European laws regarding the use of herbicides, a study on alternative methods to the traditional application of glyphosate is proposed. Specifically, the goal was to evaluate the effectiveness on weeds control of each method used in order to find the better solution.

Materials and methods: the experimental tests took place in two paths of the *Montecchia golf course* (Selvazzano, PD), in which a protocol called BioGolf is implemented, aimed at enhancing and safeguarding natural resources. Two bioerbicides and two physical treatments were tested (9 m^2 plots with 3 replicates for each treatment) and compared with no treated plots (control):

- Acetic acid (Urban Weed™)
- Pelargonic acid (Finalsan® Plus)
- Flame weeding (Emilverde, Italy)
- Mechanical scraper (Barbieri S.r.l., Italy)

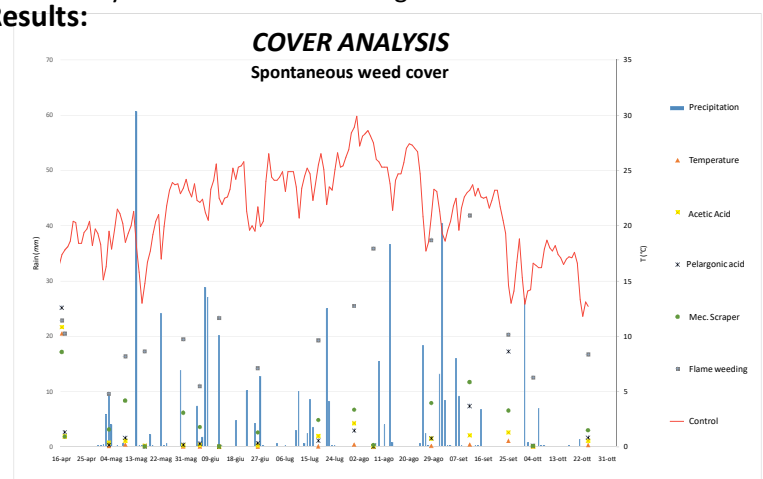
Example of photos before and after treatment

After each treatment photos were taken to evaluate the trend of weed repopulation in each plot. The images were processed using ***CANOPEO***, *a Matlab plugin,* to obtain a percentage coverage value for each parcel.

A cost analysis was done considering fixed e variable costs.

Results:

COVER ANALYSIS



COST ANALYSIS

Methods	Treated area (m^2)	Work Times (sec)	Unit Time (sec/m^2)
Acetic Ac.	9	60	6.7
Pelargonic Ac.	9	60	6.7
Mec. Scraper	9	300	33.3
Flame weeding	9	20	2.2

Methods	Cost (€/m^2)	Total cost (€)
Acetic Ac.	0.11	464.46
Pelargonic Ac.	0.20	824.98
Mec. Scraper	0.28	1137.39
Flame weeding	0.14	573.55
Glyphosate	0.05	208.41

Acetic acid showed the lower percentage of weed coverage over the experimental time and a cost of 0.11 euros/m^2.
Pelargonic acid showed good results but less effective than acetic acid; also the cost per m^2 was about the double of it.
Flame weeding showed a good initial result acting more quickly on weeds than the other methods, but its effect does not last over the time because weed repopulations were noted a week after each treatment; the cost was 0.14 euros/m^2.
Mechanical scraper showed the same trend of flame weeding with very low percentages of weed infestation only the first days after each treatment; the cost per m^2 was the highest among the treatments.

Conclusions: Considering cost analysis and the effectiveness on weeds control, the **acetic acid** (**Urban weed™)** has proved to be the best alternative solution to traditional weed control with glyphosate.