



Agronomic Evaluation of Hemp Varieties for Seeds Production

F. E. Florio¹, G. Cocetta¹, G. Cabassi², M. Povo², N. Pricca², F. Bonazza², L. Degano³, A. Ferrante¹

¹ Dipartimento di Scienze Agrarie e Ambientali, Università degli Studi di Milano, IT,

² CREA - Centro di Ricerca Zootecnia e Acquacoltura, Lodi, IT

³ Fondazione Morando Bolognini Sant'Angelo Lodigiani (LO), IT

Autore corrispondente: giacomo.cocetta@unimi.it



Introduction

Hemp (*Cannabis sativa* L.) is a crop species of the Cannabis genus belonging to the Cannabaceae family. Hemp seeds oil have a high nutritional value due to the lipid profile and to its antioxidant properties. Among fatty acids, hemp seed oil is an important source of omega-6 and omega-3, including linoleic and α -linolenic acid.

The aim of this work was the evaluation of six hemp varieties, cultivated for seeds production in Lombardy Region.

Materials and Methods

Cultivation

Six hemp varieties (Carmagnola, Carmagnola Selezionata, Felina 32, Futura 75, Santhica, USO 31) were sown for the agronomic evaluation for seeds production. The cultivation was performed in open field at the Fondazione Morando Bolognini (FMB) experimental fields, where all six varieties were compared. The effective plant density was 19.5 plants/m².

Eco-physiological determinations

Plant stress and the evaluation and light use efficiency were determined using non-destructive measurements including, chlorophyll *a* fluorescence, chlorophyll content and N Balance index. The chlorophyll *a* fluorescence was determined using a portable fluorimeter (Handy PEA, Hansatech, UK), while the chlorophyll and N balance index were determined with Dualex.

Statistical analysis

A two-way ANOVA was performed on chlorophyll *a* fluorescence data, while a one-way was performed for nitrogen balance index, chlorophyll content, and yield.

Results

The chlorophyll *a* fluorescence measured during the cultivation revealed that the stress conditions of plants increased with the progression of summer. The most tolerant variety was Carmagnola showing a lower decline of Fv/Fm ratio and Performance Index (PI), while Felina 32 showed the highest adaptation ability (Fig. 1 A, B). Leaf chlorophyll content and Nitrogen Balance index (NBI) were determined at the end of July, when hemp plants were under the highest stressful conditions due to the high temperature. Carmagnola and Felina showed the higher values of NBI and chlorophyll content. The lower values and lowest performances were found in USO 31. Yield expressed as seeds production, was lower in Carmagnola and Carmagnola Selezionata, with 183 and 154 kg/ha, respectively (Fig. 2A). The higher yield was found in Felina 32 with 461 kg/ha. Intermediate values were found for Santhica 27, Futura 75, and Uso 31. In general the low seeds production can be explained by late sowing and the high temperature recorded in July and August (Fig. 2B).

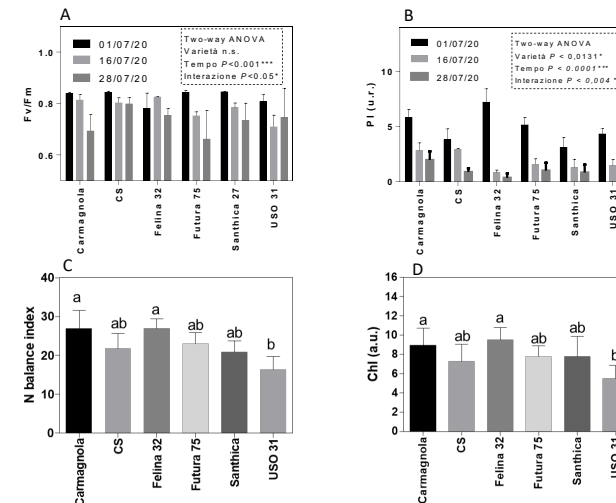


Figure 1. Chlorophyll *a* fluorescence relative to the maximum quantum efficiency of PSII, Fv/Fm (A), Performance Index (B) Nitrogen Balance Index (C), and chlorophyll content.

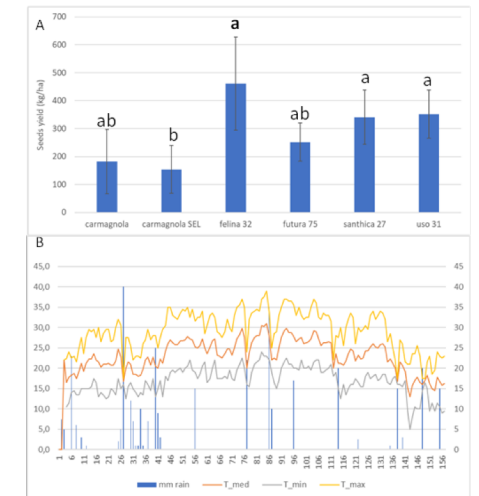


Figure 2. Seeds yield (A) and environmental parameters (B) Yield data was subjected to ANOVA and differences among means were determined using Tukey's post-test.



Conclusions

The results obtained in this first agronomic trial, suggest that the Felina 32 is the most productive species, followed by Santhica 27 and Uso 31. The whole trial have been repeated during a second year of evaluation, and data of the two years will be compared for confirming the results obtained.

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