



Giovanni Dinelli, Alessandra Bonetti, Iliaria Marotti, Maurizio Minelli, Pietro Catizone

DiSTA, Dipartimento di Scienze e Tecnologie Agroambientali, University of Bologna, Viale G. Fanin 44, 40127 Bologna, Italy

Phone: +39.051.2096672, Fax: +39.051.2096241, email: gdinelli@agrsci.unibo.it

Introduction

Common bean is a widely cultivated crop in Italy which is the European leader in bean production. At the present local ecotypes are confined in very small areas characterized by traditional cropping practices. Besides high protein and low fat content, legume crops contain isoflavones. These substances exhibited a positive action on human health in preventing cancer, heart diseases, osteoporosis (Adlercreutz, 1995). In this perspective, the aim of this work was to characterize three Italian bean ecotypes ("Fagiolo di Lamon", "Fagiolo Zolfino del Pratomagno" and "Fagiolo di Sarconi") for biochemical and nutraceutical characteristics. Such an effort could contribute to the protection of these legumes for their exploitation as a source of "functional" food.

Materials and methods

Twenty-three ecotypes from Lamon (Veneto), Pratomagno (Toscana) and Sarconi (Basilicata) areas and four control cultivars "Contender", "Tendergreen", "Sanilac" and "Lingua di Fuoco" were investigated. Proteins, lipids, ashes (AOAC, 1990), fibers, percentage of tegument, content and electrophoretic characterization (SDS-PAGE) of G1 and G2 protein fractions (Limongelli et al., 1996), erithroagglutinating index of G2 fraction (Duranti et al., 1989) were determined. Extraction and analysis of isoflavones were performed according to Wang and Murphy (1994).

Results and discussion

The three bean ecotypes exhibit interesting biochemical traits useful for their exploitation from either a nutritional and a healthy point of view (Table 1). The total protein content is quite remarkable in Lamon ecotypes. Except Lamon beans, a low tegument percentage was detected, and this was positively linked to cooking time and taste properties. Mean content of G1 and G2 fraction, 14% and 10% respectively, observed for Zolfino beans were higher than values reported in literature for common bean cultivars (12%) (Ma and Bliss, 1978). Lamon and Sarconi beans presented an electrophoretic pattern similar to cultivar "Contender" (type "C"), while Zolfino beans presented a pattern similar to cultivar "Sanilac" (type "S") (Figure 1a, b). Data are in general agreement with literature as type "C" and "S" are mainly represented in Italian bean ecotypes (Lioi, 1989), while type "T" (Tendergreen) pattern, shared by the major part of traded cultivars, is less common in the bean ecotypes of Mediterranean area.

Table 1: Biochemical characterization of Italian bean ecotypes and control cultivars employed in this study.

Ecotypes	% Protein	% Lipid	% Ashes	% Tegument	% Fibers	% Phas. G1	% Phas. G2	Erithroaggl. Index
Sarconi	24,1	1,3	3,8	7,5	15,6	10,6	5,9	32,0
Lamon	25,3	1,3	3,9	6,7	15,9	11,0	5,3	66,1
Zolfino	25,4	1,5	4,7	6,9	18,7	14,5	10,1	37,1
Contender	23,1	1,0	3,8	10,3	20,1	11,8	4,4	13,4
Tendergreen	24,1	1,4	4,1	9,5	23,0	8,59	6,8	23,1
Sanilac	24,4	1,5	4,4	8,7	17,3	10,2	6,6	41,1
Lingua di f.	27,9	1,2	4,2	7,1	11,8	13,3	6,4	50,5

HPLC analysis of isoflavones highlighted a high content of these substances in Zolfino beans with respect to the other examined ecotypes (Figure 2 b-c). In particular three different isoflavones were found in Zolfino beans. The isoflavone migrating at 16 min was identified as genistin, while studies are in progress for the identification of the chemical structures of the remaining two isoflavone peaks. Only one ecotype from Sarconi area exhibited an isoflavone chromatogram similar to that of Zolfino beans (Fig. 2a).

Biochemical data confirmed the nutritional value of these Italian ecotypes. The detection of a remarkable amount of isoflavones in some of the tested bean ecotypes (Zolfino) may suggest their usage as a source of functional and nutraceutical compounds.

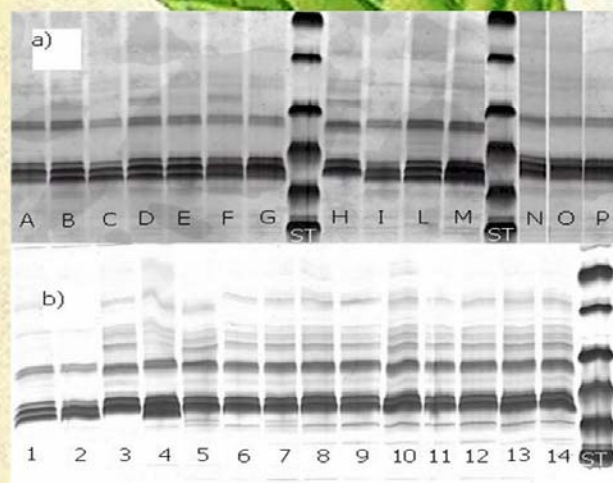


Figure 1: Electrophoretic patterns of G1 from Sarconi and Lamon a) and from Zolfino ecotypes b). A-G Sarconi ecotypes; H-M) S, T, C, and Lingua di Fuoco standards; N-P) Lamon ecotypes; 1-4) T, C, S and Lingua di Fuoco standards; 5-14) Zolfino ecotypes.

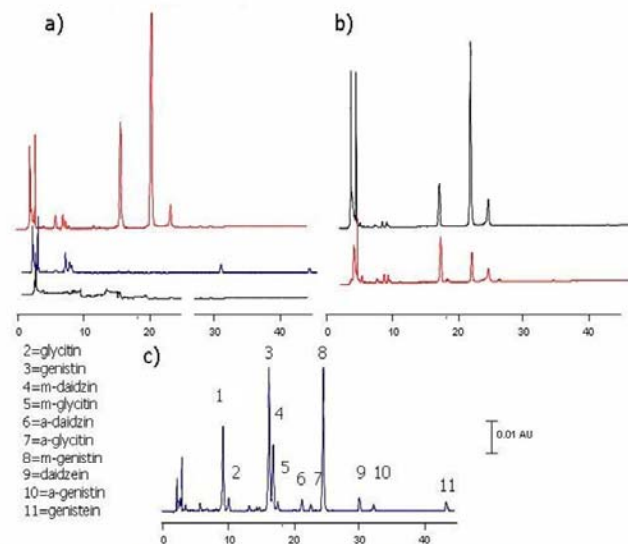


Figure 2: HPLC chromatograms of isoflavones extracted from Sarconi beans (a), Zolfino beans (b) and soybean (c).

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