

# Preliminary results concerning the weeding degree of Jonathan apple tree variety cultivated in conditions of the Didactic Station Timisoara

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**Abstract** Orchards are usually invaded, the same as any other culture, by weeds such as: couch grass (*Agropyron repens*), creeping thistle (*Cirsium arvense*), redroot pigweed (*Amaranthus retroflexus*), sheperd's purse (*Capsella bursa-pastoris*), field bindweed (*Convolvulus arvensis*), common chickweed (*Stellaria media*), dandelion (*Taraxacum officinalis*) and many others, which compete with the trees for nutrients' and water's absorption, having a negative impact upon their productivity. In the orchard of the Didactic Station Timisoara there are cultivated six varieties of apple trees, having the same culture technology, one of them being Jonathan variety, also known as "the king of apples". In 2008, the weeding degree of Jonathan apple tree variety, cultivated in conditions of the Didactic Station Timisoara, was of over 95% so weed control was absolutely necessary. Knowing the predominant weeds is very important in any culture technology so that the growers to be able to control them in the best efficient way, which is why weed filing is an important step before applying the control methods. After doing the weed filing, we noticed that the predominant weeds in Jonathan apple tree variety culture, in 2008, were: *Agropyron repens*, *Stellaria media*, *Cirsium arvensis* and *Capsella bursa-pastoris*.

## Key words

Jonathan, apple, weeds, weed filing, dicotyledonous, monocotyledonous, annuals, perennials

Weeds are a permanent problem for fruit growers, as well as for any other growers, due to the fact that they decrease the fruiting capacity and they are perfect hosts for different diseases and pests, with direct impact upon the production, which can constantly diminish (1). They compete with the trees for the absorption of water and nutrients and they determine a more accelerated vegetation rhythm, at the same time being an obstacle in doing the maintaining works in the orchard.

Most of the orchards are being invaded by weeds that propagate through rhizomes, like *Agropyron repens*, *Cynodon dactylon*, or root shoots, like *Cirsium arvense*, *Convolvulus arvensis* and *Sonchus arvensis*, which are difficult to control, as well as annuals, such as *Stellaria media*, *Capsella bursa-pastoris* and *Veronica hederifolia*. The total fresh weight of weeds that can develop on one hectare of orchard can get to tens of tones annually (including the total roots weight) getting close to the total green mass of some utile culture plants (3, 4).

In order to establish the efficient and less expensive weed control methods, it is necessary that the grower to know the species of weeds and the weeding degree in the orchard, which can be

done by weed filing. By this one can establish the quantitative and qualitative floristic composition in the orchard (2).

Jonathan apple tree variety, also called "the king of apples" is one of the eldest varieties cultivated in our country and still much appreciated by fruit growers, but very sensitive to some diseases like powdery mildew and scab and very susceptible concerning its production that might be also influenced by the weeds existing in the orchard.

In this article we present some preliminary results, obtained in 2008 for Jonathan apple tree variety, concerning the researches made for the PhD Thesis entitled "*Monitorising the Influence of Some Agrotechnical Works for Maintaining the Soil in Apple Tree Orchards upon the Physical-Chemical Features of Fruits in Conditions of the Didactic Station Timisoara*".

## Material and Methods

Jonathan apple tree variety, grafted on M26, is cultivated in an intensive system, being planted in 1997 at the distance of 4 m between the rows and 2 m

between the trees on a row, being in the XII<sup>th</sup> year since planting and having a traditional culture technology.

In order to determine the weeding degree in the orchard, in 2008 we did the weed filing for Jonathan variety cultivated in conditions of the Didactic Station Timisoara in the control variant (witness) and the other variants, where there were determined the dominant weed species and there were chosen the proper control measures. The weed filing was made before and after doing the herbicide treatments and the manual and mechanical works. After sprayings, the first reading was made at 12 days and the second one a month before harvesting.

Data were collected using the quantitative-numeric method, which consists in counting the weed species on the experimental plots surface, which is a hustler and sufficiently accurate method. The metric framework used for weed filing has a surface of 0.25 square meters, being a square with the interior side of 0.5 m.

When we chose the determination points, we wanted them to be as representative as possible concerning the weeding status, being placed on the tree rows and marked on the filed with four pickets placed in the interior corners of the metric framework. Beside the effective number of weeds belonging to different species found inside the metric framework was marked down the phenophase of each weed species as it follows: the plant without reproduction organs (A); the plant having flower buds or ear (grasses) (B); flowering plant (C); the plant having fruits (D); the plant having spread its fruits and seeds (E). In order to include the weeds in the botanical class there were used the symbols: D.a. – annual dicotyledonous, D.p. – perennial dicotyledonous, M.a. – annual monocotyledonous, M.p. – perennial monocotyledonous.

Data processing consisted in analyzing the primary data and writing the weed cover degree card, which needed the calculation of the analytic and synthetic data. Calculating the synthetic data consisted in expressing the above mentioned biological category according to: the number of species; the medium number of individuals; the participation of those weeds to the general weed cover degree.

Weed filing was made for each experimental variant, as it follows: V1 – no herbicides, no mechanical or manual works – control; V2 – Roundup 360 SL (3 l/ha) on the tree row, the interval mowed; V3 – Basta 14 SL (5 l/ha) on the tree row, the interval mowed; V4 – Gallant Super (1 l/ha) on the tree row, the interval mowed; V5 – mulching with mowed grass of the interval; V6 – Roundup 360 SL (3 l/ha) + 2 manual hoes on the tree row; V7 – Basta 14 SL (5 l/ha) + 2 manual hoes on the tree row; V8 – Gallant Super (1 l/ha) + 2 manual hoes on the tree row; V9 – Roundup 360 SL (3 l/ha) on the row + grass sod between the rows; V10 – 2 manual hoes + 2 mechanical works.

## Results Obtained

The climatic conditions of 2008 had a huge impact upon weeding degree. Though the rainfall quantity was moderate, it appeared in the favourable periods for weeds' development, so that the number of weeds/m<sup>2</sup> was pretty high. The weed filling results are being presented in table 1.a. for the first five variants and in table 1.b. for the other five variants.

In variant 1 – the control not treated – there were observed 17 weed species, with a total average number of 154.67 weeds/m<sup>2</sup>, of which the most predominant being *Agropyron repens* (16.38%), *Stellaria media* (14.66%), *Cynodon dactylon* (13.80%) and *Convolvulus arvensis* (12.07%). Of the total number of weed species, 76.47% were dicotyledonous and 23.53% were monocotyledonous. The lowest participation percent was observed for six weed species: *Plantago major*, *Portulaca oleracea* and *Sonchus arvensis* with 0.86% each and *Echinochloa crus-galli*, *Sinapis arvensis* and *Taraxacum officinalis* with 2.67% each.

The number of weeds, noticed in the second variant, was of 149.33 weeds/m<sup>2</sup>, of which 50% being annuals and 50% perennials. The highest participation degree was observed for *Agropyron repens* (17.88%) and *Stellaria media* (14.29%), but also for *Cirsium arvensis* and *Convolvulus arvensis* with 9.82% each. 75% of the weed species were dicotyledonous and the rest of 25% were monocotyledonous.

Variant 3 had a total number of 12 weed species, of which 91.67% dicotyledonous and 8.33% monocotyledonous. The average total number was 132.00 weeds/m<sup>2</sup>, the highest percentage of participation being represented by *Stellaria media* (26.26%), followed by *Capsella bursa-pastoris* (19.19%), *Agropyron repens* (17.17%), *Veronica hederifolia* (12.12%) and *Taraxacum officinalis* (11.11%). In this variant the annuals had a higher participation degree (58.33%) than the perennial weeds.

In variant 4 the total number of weeds was of only 10, being predominant the annual weeds (7 species), while the dicotyledonous represented 90% of the total weed species. The same as in the other variants, predominant were: *Stellaria media* (27.83%), *Agropyron repens* (19.59%), *Capsella bursa-pastoris* (17.53%), *Veronica hederifolia* (13.40%), and *Taraxacum officinalis* (8.25%). The total number of weeds in this variant was 129.33 weeds/m<sup>2</sup>, lower than in other variants but with high participation percentages of some weed species.

Variant 5 had a total of 16 weed species, of which 12 were dicotyledonous (75%) and 4 monocotyledonous (25%). The predominant weeds were: *Agropyron repens* (17.39%), *Stellaria media* (14.78%), *Cynodon dactylon* (13.91%), *Veronica hederifolia* (10.43%) and *Convolvulus arvensis* (9.57%). Of the total number of weeds in this variant

the percentage of annuals was of 56.25% (9 species) and the one of perennials 43.75% (7 species).

Variant 6 had 16 weed species and a total number of weeds 148.00 weeds/m<sup>2</sup>, of which 13 were dicotyledonous (81.25%) and 3 were monocotyledonous (18.75%). In this variant the percentage of annual weeds (10 species) was of 62.5%, while the perennials (6 species) represented 37.5% of the total number of weeds, being predominant *Agropyron repens*, *Stellaria media*, *Cirsium arvensis* and *Convolvulus arvensis*.

The total number of weeds noticed in variant 7 was of 141.33 weeds/m<sup>2</sup>, of which 57.14% being annuals and 42.86% perennials. The highest participation degree was observed for *Stellaria media* (20.75%), *Agropyron repens* (16.04%) and *Capsella bursa-pastoris* with 15.09%. There were predominant the dicotyledonous (11 species) 78.57% and the rest of 21.43% were monocotyledonous (3 species).

In variant 8 there were observed 12 weed species, of which 9 were dicotyledonous (75%) and 3 were monocotyledonous (25%). In this variant there are only perennial monocotyledonous, the annuals not being found, but the percentage of annual weeds was of 50% as well as the perennials.

The total number of weeds in variant 9 was 153.33 weeds/m<sup>2</sup>, with *Agropyron repens*, *Cirsium arvensis*, *Sonchus arvensis* and *Stellaria media* predominant weeds. There were 11 species of dicotyledonous weeds (73.33%) and 4 species of monocotyledonous weeds (26.67%).

Variant 10 had a total number of weeds of 157.33 weeds/m<sup>2</sup>, being observed 15 weed species, of which there were predominant: *Agropyron repens*, *Cynodon dactylon*, *Stellaria media*, *Veronica hederifolia* and *Convolvulus arvensis* with over 8.50% participation degrees. Monocotyledonous weeds represent 20%, while dicotyledonous weeds represent 80%. By analysing the percent of annual and perennial weeds, we can observe that annuals represent 46.67%

and perennials 53.33% of the total number of weeds (table 1.b.).

## Conclusions

The weeding degree of Jonathan apple tree variety was pretty high, in all of the variants being predominant the dicotyledonous weeds and the majority of weeds being annuals.

The predominant perennials were: *Agropyron repens*, *Cynodon dactylon*, *Cirsium arvense*, *Convolvulus arvensis* and the predominant annuals were: *Stellaria media* and *Veronica hederifolia*

There were preponderant the dicotyledonous weeds, mostly the annuals than the perennials, while of the monocotyledonous were more present the perennials than the annuals.

The rainfall quantities in 2008 were moderate, but favourable for weeds' development, in this way determining a high weeding degree.

Knowing the floristic composition of weeds in Jonathan apple tree variety we can use in the mentioned variants the specific products or works in order to get an efficient control of them.

## References

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Table 1.a.

## Floristic composition of weeds, Jonathan variety – 2008 – initial weed filing

No	Species	Phenophase	Bot.class	Variant 1		Variant 2		Variant 3		Variant 4		Variant 5	
				Av. no. of weeds/m <sup>2</sup>	Participation (%)	Av. no. of weeds/m <sup>2</sup>	Participation (%)	Av. no. of weeds/m <sup>2</sup>	Participation (%)	Av. no. of weeds/m <sup>2</sup>	Participation (%)	Av. no. of weeds/m <sup>2</sup>	Participation (%)
1	<i>Agropyron repens</i>	A-C	M.p.	25.33	16.38	26.67	17.88	22.67	17.17	25.33	19.59	26.67	17.39
2	<i>Amaranthus retroflexus</i>	A-C	D.a.	8.00	5.17	9.33	6.25	2.67	2.02	4.00	3.09	6.67	4.35
3	<i>Capsella bursa-pastoris</i>	A-C	D.a.	5.33	3.45	6.67	4.46	25.33	19.19	22.67	17.53	5.33	3.48
4	<i>Cardaria draba</i>	B-C	D.p.	4.00	2.95	2.67	1.79	1.33	1.01			6.67	4.35
5	<i>Chenopodium album</i>	B	D.a.	6.67	4.31	5.33	3.57	4.00	3.03	2.67	2.06	4.00	2.61
6	<i>Cirsium arvense</i>	A-B	D.p.	10.67	6.90	14.67	9.82	2.67	2.02	5.33	4.12	10.67	6.96
7	<i>Convolvulus arvensis</i>	A-C	D.p.	18.67	12.07	14.67	9.82	4.00	3.03	4.00	3.09	14.67	9.57
8	<i>Cynodon dactylon</i>	A-C	M.p.	21.33	13.80	10.67	7.14					21.33	13.91
9	<i>Echinochloa crus-galli</i>	B	M.a.	2.67	1.72	2.67	1.79					1.33	0.87
10	<i>Papaver rhoes</i>	B-C	D.a.										
11	<i>Plantago major</i>	B	D.a.	1.33	0.86			2.67	2.02	1.33	1.03		
12	<i>Polygonum aviculare</i>	B	D.a.			1.33	0.89					1.33	0.87
13	<i>Portulaca oleracea</i>	B-C	D.p.	1.33	0.86	2.67	1.79						
14	<i>Sinapis arvensis</i>	A-C	D.a.	2.67	1.72							1.33	0.87
15	<i>Sonchus arvensis</i>	B-C	D.p.	1.33	0.86	10.67	7.14	1.33	1.01			2.67	1.74
16	<i>Sorghum halepense</i>	A-B	M.p.	6.67	4.31	6.67	4.46					6.67	4.35
17	<i>Stellaria media</i>	A-C	D.a.	22.67	14.66	21.33	14.29	34.67	26.26	36.00	27.83	22.67	14.78
18	<i>Taraxacum officinalis</i>	B-C	D.a.	2.67	1.72	2.67	1.79	14.67	11.11	10.67	8.25	5.33	3.478
19	<i>Veronica hederifolia</i>	A-C	D.a.	13.33	8.62	10.67	7.14	16.00	12.12	17.33	13.40	16.00	10.43
	<b>TOTAL</b>			<b>154.67</b>	<b>100.00</b>	<b>149.33</b>	<b>100.00</b>	<b>132.00</b>	<b>100.00</b>	<b>129.33</b>	<b>100.00</b>	<b>153.33</b>	<b>100.00</b>

Table 1.b.

## Floristic composition of weeds, Jonathan variety – 2008 – initial weed filing

No	Species	Phenophase	Bot.class	Variant 6		Variant 7		Variant 8		Variant 9		Variant 10	
				Av. no. of weeds/m <sup>2</sup>	Participation (%)	Av. no. of weeds/m <sup>2</sup>	Participation (%)	Av. no. of weeds/m <sup>2</sup>	Participation (%)	Av. no. of weeds/m <sup>2</sup>	Participation (%)	Av. no. of weeds/m <sup>2</sup>	Participation (%)
1	<i>Agropyron repens</i>	A-C	M.p.	22.67	15.32	22.67	16.04	34.67	27.37	29.33	19.13	29.33	18.64
2	<i>Amaranthus retroflexus</i>	A-C	D.a.	10.67	7.21	4.00	2.83	6.67	5.26	9.33	6.09	8.00	5.08
3	<i>Capsella bursa-pastoris</i>	A-C	D.a.	10.67	7.21	21.33	15.09	18.67	14.74	5.33	3.48	4.00	2.54
4	<i>Cardaria draba</i>	B-C	D.p.	6.67	4.51			1.33	1.05	6.67	4.35	6.67	4.24
5	<i>Chenopodium album</i>	B	D.a.	2.67	1.80	1.33	0.94					2.67	1.69
6	<i>Cirsium arvense</i>	A-B	D.p.	14.67	9.91	10.67	7.55	6.67	5.26	18.67	12.17	12.00	7.63
7	<i>Convolvulus arvensis</i>	A-C	D.p.	13.33	9.01	5.33	3.77	1.33	1.05	10.67	6.96	13.33	8.50
8	<i>Cynodon dactylon</i>	A-C	M.p.	6.67	4.51			4.00	3.16	5.33	3.48	22.67	14.41
9	<i>Echinochloa crus-galli</i>	B	M.a.	1.33	0.90	9.33	6.60			5.33	3.48		
10	<i>Plantago major</i>	B	D.a.	5.33	3.60					2.67	1.74		
11	<i>Polygonum aviculare</i>	B	D.a.			2.67	1.89	1.33	1.05			4.00	2.54
12	<i>Portulaca oleracea</i>	B-C	D.p.										
13	<i>Rubus caesius</i>	A	D.p.	2.67	1.80	1.33	0.94			4.00	2.61	2.67	1.69
14	<i>Sinapis arvensis</i>	A-C	D.a.										
15	<i>Sonchus arvensis</i>	B-C	D.p.	9.33	6.31	5.33	3.77			18.67	12.17	4.00	2.54
16	<i>Sorghum halepense</i>	A-B	M.p.	5.33	3.60	4.00	2.83	4.00	3.16	6.67	4.35	6.67	4.24
17	<i>Stellaria media</i>	A-C	D.a.	18.67	12.61	29.33	20.75	33.33	26.32	18.67	12.17	20.00	12.71
18	<i>Taraxacum officinalis</i>	B-C	D.a.	8.00	5.41	10.67	7.55	4.00	3.16	2.67	1.74	6.67	4.24
19	<i>Veronica hederifolia</i>	A-C	D.a.	9.33	6.31	13.33	9.43	10.67	8.42	9.33	6.09	14.67	9.32
	<b>TOTAL</b>			<b>148.00</b>	<b>100.00</b>	<b>141.33</b>	<b>100.00</b>	<b>126.67</b>	<b>100.00</b>	<b>153.33</b>	<b>100.00</b>	<b>157.33</b>	<b>100.00</b>

