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OIL RAPE SEED HARVESTING SEASON 2005 IN EASTERN SLAVONIA

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Abstract: Monitoring of oil seed rape harvest on family farm in Baranja showed that imported combines "A" and "B" with wheat headers were making equal losses on cutter bar (2,7 and 2,2%), losses on divider were even greater (4,8-5,2 and 7,1% and on sieves A harvester had 1,8%, while >2% was determined at combine harvester "B". Fully equipped for oil rape seed harvesting, domestic combine harvester "C" was making losses of 16,1% on cutter bar and dividers and >2% on sieves. At business entity IPK Osijek, location Bara before harvesting crops of oil seed rape were treated with Agrovital (adhesive) and total losses of 7,0% at "A" combine, 12,85% at combine "B", and finally 10,35% of total losses were recorded with domestic wheat combine harvester. In harvesting untreated, logged and convoluted crop with fully equipped imported combine harvester "D" was making loss of even 26,0%, while domestic wheat combine harvester had 24,4% on cutter bar, 22,8% on divider and >2% on sieves.

Key words: combine, harvesting, losses, oil seed rape.

INTRODUCTION

Oil seed rape growing (*Brassica napus sp. oleifera* L.) has been intensified in EU during the last 15 years whereas in Croatia it has still been grown on 13 to 16 thousand hectares, depending on the year (table 1). It is grown for oil, crushed seed, cake and seeds containing 40-48 % oil and 18-25 % proteins, [2] and [3]. Rape yields in Western Europe are 3.5-4.0 t ha⁻¹ in average, whereas Croatian mean yield is 2.2 t ha⁻¹. Rape harvest in Croatia is mainly carried out by a combine with header for wheat and other cereals harvesting. Thus, occurring losses are unacceptable high, ranging 10-30 % of the yield [4]. Harvest should be done when a crop is yellowish-brown color, stem yellowish-yellow and leaves mostly dry or yellow-brown if not dry [1]. Husks are primarily yellow-brown color on the side branches and only a little bit yellow-greenish. Central branch husks are grey-brown in color. They crack on the central branch if the husk stem is slightly tapped. The oil seed rape harvesting losses have been rarely quantified in our

country. Almost three decades ago, harvest grain losses of the rape was studied at the Faculty of Agronomy in Zagreb - Department of Agricultural Engineering [4]. On receiving results, extension of the wheat header deck was suggested to be built-in on the total length of 600 mm. In the year of EU association, Croatia will be obliged to have a share of bio-diesel fuel consumption at the level of 2 % of the total mineral origin fuel consumption [5]. A bio-diesel portion should in the further years be increased by 0.75 % annually until 2010, thus meaning that in 2020 Croatia should have reached 20 % of bio-diesel on its market [6].

MATERIAL AND METHODS

The research was carried out during the rape harvest on both the family farm in Baranja and IPK (agricultural and processing plant) Osijek, operating unit Bara in 2005. The rape harvest at family farm in Baranja was done by the combines A and B equipped with wheat headers and a combine C with a special rape header (header deck length $l=800$ mm + cutter bar). At the operating unit Bara the harvest was performed by the combine A (header deck length $l=1000$ mm + cutter bar) and combine B (vertical cutter bar divider) and a combine C that was equipped with wheat header. Harvesting of the cultivar Express at family farm in Baranja was done on 29th of June, while cultivars Navajo and Bristol were harvested at IPK Osijek operating unit Bara on 1st and 5th of July 2005. The header losses were collected on its middle part and at divider by the boxes of $A=0,1$ m² placed on the soil prior to a combine pass. Threshing losses were determined by five (5) conical PVC containers (invented and produced by the Institute for Agricultural Engineering and the Faculty of Agriculture for crop production, Halle Germany). These conical containers were thrown into the flow of outgoing mass falling from the combine. Plants height was determined by a meter whereas a stand by 1 m². The crops status was determined by the researcher estimation. Oil seed rape grain yield and moisture were determined in IPK Oil factory Čepin p.l.c. [1] and [2].

Table 1. Total rape production in the Republic of Croatia and worldwide

Year	Republic of Croatia		Production (t)	
	Harvested area (ha)	Yield (t ha ⁻¹)	Republic of Croatia	World
1992	11.743	2,06	24.183	26,716.865
1993	13.010	2,20	28.665	26,149.145
1994	13.889	2,04	28.341	29,654.969
1995	10.982	2,23	24.472	34,178.196
1996	7.651	1,52	11.661	30,421.211
1997	5.356	2,09	11.181	35,061.083
1998	8.949	2,45	21.967	35,744.416
1999	16.234	2,01	32.581	43,172.675
2000	12.886	2,28	29.436	39,511.417
2001	10.319	2,18	22.456	35,915.962
2002	13.041	1,96	25.585	33,999.990
2003	15.524	1,84	26.000	35,931.652
2004	14.299	2,33	33.167	42,000.000
Average	11.837	2,09	24.591	34,515.384

Data Source: FAO

RESULTS AND DISCUSSION

During oil seed rape growing season, September 2004 to June 2005 total precipitation of 638.2 mm was recorded, which was 12.5 % above ten (10) years average. The precipitation deficiency occurred in September (sowing month), while excess were recorded in November 2004 and June 2005. Logged plants and prolong harvest were considerably affected by the stormy weather with 44 mm of precipitation on 1st of July and 42.6 mm on 4th of July.

Table 2. Precipitation (mm) during growing season 2004/05 and 10-years average period 1995-2004.

Name	IX 2004	X	XI	XII	I 2005	II	III	IV	V	VI	Total
2004/05	44,7	80,1	120,7	39,9	33,3	65,9	45,3	56,0	60,2	92,1	638,2
1995-2004	83,5	58,5	69,8	55,0	48,3	34,8	32,4	57,9	69,7	57,6	567,5

Table 3. Monthly air temperature (°C) during growing season in 2004/05 and 10-years average 1995-2004.

Name	IX	X	XI	XII	I	II	III	IV	V	VI	Average
2004/05	15,8	13,0	6,0	2,1	0,0	-3,6	3,9	11,6	17,4	20,1	11,24
1961-90	16,6	11,2	5,4	0,9	-1,2	1,6	6,1	11,3	16,5	19,5	9,9

Mean monthly air temperature in the last four (4) months of 2004 and first six (6) months of 2005 was 14% above ten (10) years average. October and December were warmer, while February and March that were colder than long-term average.

Crop of the cultivar Express was on the Baranja family farm upright, slightly lodged with a stand of the 24 plants m⁻². The loss of 1.8% was recorded at the threshing section of the combine "A", whereas not sufficiently adjusted combines B and C had loss of >2%. The combine B had in average, 38 grains/PVC containers, while combine C had 30 grains in average. Calibration graph of the PVC containers doesn't suppose more than average of 10 grains/container for it is already loss of 2%. Thus, larger number of the grains is an obvious indicator of the combine threshing section being not properly adjusted. A header loss of 9.2 and 6.9% at the combine C that was equipped with a special rape header is the consequence of improper reel adjustment by unskilled operator.

Table 4. Harvesting loss (%) on the family farm, (yield of 3.060 kg ha⁻¹ and grain moisture of 11,0 -11,5%)

Name	Combine with the wheat header		Combine with the rape header C
	A	B	
Header	2,7	2,2	9,2
Divider	4,8-5,2	7,1	6,9
Sieves	1,8	>2	>2
Total	9,3-9,7		

At the operating unit Bara there were rape cultivar Navajo treated (24 June) with Agrovital in a dose of 0,7 l + 80 l water ha⁻¹ and mostly lodged and unprotected rape crop of the cultivar Bristol. The determined stand on the table was 26 plants m². Harvest loss for this site can be seen in Table 5.

Table 5. Harvesting loss (%) on the operating unit "Bara",
(yield of 2.602 kg ha⁻¹ and grain moisture of 11,36 %)

Name	Combine with the rape header (desk+ vertical cutter bar) A ¹	Combine with the vertical cutter bar B ¹	Combine with the wheat header C ¹	Combine with the rape header (desk+cutter bar) D*	Combine with the wheat header E*
Header	2,7	10,8	7,5	14,7	24,4
Divider	4,0	1,7	2,2	10,3	22,8
Sieves	0,3	0,35	0,65	1,0	>2
Total	7,0	12,85	10,35	26,0	-

¹Crop treated with Agrovital

*Crop not treated with Agrovital (sticky substance)

The lowest losses were recorded at the combine A (the extended deck of 1000 mm and vertical cutter bar). This combine had the lowest header loss of 2.7% and total loss of 7.0 % i.e. 182 kg ha⁻¹. The combine B (only vertical cutter bar divider) had the header loss of 10.8 %, which was 4 times higher than the combine A. The combine C had the header loss of 7.5 %, header divider 2,2 %, thresher 0.65 % and total losses of 10,35 % i.e. 269 kg ha⁻¹. Very high losses were recorded with the combine E. One of the possible causes was untreated crop with Agrovital and very high percent of lodged crop (margin table parts of 70-80%, within the table 30-40%). At the same field fully equipped combine D had losses at the header of 14.7 %, divider 10.3 % and 1.0 % at the threshing section i.e. extremely high total losses of 26 % i.e. 677 kg ha⁻¹. Even such high losses recorded at combine harvester D are considerably less compared to the combine E losses of almost 50%, which means that half of the yield wasn't gathered but left on the field.

CONCLUSION

Based upon the annual monitoring and checking combine grain losses in oil seed rape harvesting on family farm in Baranja and at IPK Osijek fields in 2005 the following conclusions can be drawn:

- minimal harvesting losses can be achieved only with properly equipped and adjusted combine i.e. rape header (extended header deck + right vertical cutter bar divider);
- special attention should be aimed to the reel adjustment (position and reel peripheral velocity);
- harvest of the lodged and interweaved crops with combine equipped with wheat header or partly equipped combine (only vertical cutter bar divider) should be avoided, if possible;
- a skillful staff with appropriate accessory (metal boxes and PVC conical containers) should carry out determination of harvesting loss;
- the testing and monitoring should be by all means continued to approve previous knowledge and acquire new experience in oil seed rape harvesting.

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UBIRANJE ULJANE REPICE U SEZONI 2005.
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Sadržaj: Ispitivanje ubiranja uljane repice na porodičnoj farmi u Baranji pokazalo je da su uvozni kombajni "A" i "B", sa žitnim hederima, ostvarili gubitke na režućem aparatu (2,7 i 2,2%) a čak i veće gubitke na razdeljivaču (4,8-5,2% i 7,1%), gubici na sitima kombajna "A" su bili 1,8%, dok je više od 2% gubitaka bilo utvrđeno kod kombajna "B". Kombajn "C" domaće proizvodnje, potpuno opremljen za ubiranje uljane repice ostvario je gubitke od 16,1% na režućem aparatu, odnosno, na razdeljivaču, a više od 2% na sitima. U preduzeću IPK Osijek, lokacija Bara, usev je pre ubiranja tretiran Agrovitalom (adhezivno) i ukupni gubici kombajna "A" su bili 7%, kombajna "B" 12,85%, a, konačno 10,35% pri radu kombajna "C", odnosno, domaćeg žitnog kombajna. pri ubiranju netretiranog povijenog i poleglog useva. Sa potpuno opremljenim uvoznim kombajnom "D" ostvareni su gubici od 26%, dok je domaći kombajn imao gubitke od 24,4% na režućem aparatu, a na razdeljivaču 22,8% i sitima više od 2%.

Ključne reči: kombajn, ubiranje, gubici, uljana repica.