

## INVESTIGATION FOR RAPESEED SHATTERING IN IRAN. CASE STUDY: MARKAZI PROVINCE

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### Abstract

Previous studies were determined that close to 10.8% of total rapeseed production in Makazi state farms were loosed. In addition, the earlier studied show that there are other kinds of looses for transportation basis and storage of seeds. In this paper we tried to show a several numbers of reasons for rapeseed shattering in Markazi state farms. The aim of this attention is introduce misinformed ripening in farms as a very important consideration and try to highlight that. According to the local investigation and farm surveys during 2004-2007 the rate of seed shattering were 3-130 thousand and sometimes up to 200 seeds per square meter. On 2007 growing year the rate of seed shattering was 429.5 t/h in Markazi state. The results of recent study showed that, there are 16 main reasons for seed shattering procedure root. Next, the most important case for shattering was the weeds pollutions density in farms. In this case, the seeds were wasted about 268 kg/h in normal farms or farms by potential yield about 3.5 t/h. Harvesting tools and unusual plant density are another main reasons for rapeseed shattering. Misinformed ripening makes different plant humidity contents about 8%, it was harmful for operation for seed harvesting. This important parameter also, show that the same plant wetness on harvest time is extremely important for reduce the rapeseeds shattering in same farm condition.

**Keywords:** Rapeseed, grain shattering, Iran

### Introduction

Increase rapidly of Iranian rapeseed field area from 17200ha at 1998-1999 to 174500 ha in 2005-2006 show that the rapeseed is an economic cash crops (Table1). In Iranian condition the first stage of rapeseeds growth and development that accurse at the end of September to April, have not any important problems but after the over wintering and during the fast reproduction growth and changing of temperature in late of spring to the first of summer, the rape farms award to many of environmental stresses same as heat stress in grain ripening time and grain shattering respectively. Thus the study in shattering of seeds is very young and is economic subject for producer of the rapeseed in Iran. Difference between grain production in field and obtained yield called "grain shattering". One type of grain waste is grain shattering in rapeseed. Grain waste occurs in several stages including farm losses, transport, and storage processing. Difference between grain production in field and obtained yield called "grain shattering". One type of grain waste is grain shattering in rapeseed. Grain waste occurs in several stages including farm losses, transport, and storage processing. For farmers farm loss of grain is important. This losses start from seed maturity up to harvesting time. Farm losses is due to bird activity, mice's, insects and physical and biological factors. Grain shattering exists in rapeseed but increase and decrease of it depend on farm management. Grain shattering of rapeseed is more than other oil seeds. Difference between grain color of rapeseed and soil color shows that shattering is more evident. Immature grains shatter soon after small hitting. Rapeseed can be direct combined; however, to reduce the risk of shatter, swath the crop when the bottom pods are brown, and the pods at the top of the plant green, but well-filled

Table1. Harvest area, seed yield and seed production rate in Markazi province.

Year	Harvest area (ha)	Seed production(t)	Seed yield (t/ha)
1998-1999	17240	17010	987
1999-2000	26649	30246	1135
2000-2001	48417.6	49255	1017
2001-2002	71403	112164	1571
2002-2003	73502.1	105613.7	1437
2003-2004	127938.5	212112	1658
2004-2005	174500.2	197249	1703

## Discussion

### Type of grain shattering in Iran

The development of an ideotype rapeseed, which more resistant to seed losses at harvest, depends on the identification of relevant characteristics of the plant characteristics.

Table1. Roots and causes type of grain shattering in Iran

code	Shattering sources	Shattering rate			
		No.seed /m <sup>2</sup>	Seed g / m <sup>2</sup>	Seed shattering % ( base 3.5 t/ha average yield)	Seed shattering kg/ha ( base 3.5 t/ha average yield)
1	Sensitive germplasms	N/A	N/A	N/A	N/A
2	Stem verse	29100	116	33/3	1164
3	Immature farms	25000	100	28/57	1000
4	Immature plants	15000	60	17/4	600
5	Hard weather changes	N/A	N/A	N/A	N/A
6	Non matching germplasms	12500	50	14/28	500
7	High stem height by Nitrogen	15000	60	17/4	600
8	High stem height generally	54000	216	61/8	2160
9	Low plant density( less than 20/m <sup>2</sup> )	27500	110	31/42	1100
10	High plant density (more than 100/m <sup>2</sup> )	32500	130	37/14	1300
11	Weed pollution	67000	201	100/5	2010*
12	5% in normal harvest by combine machine	750	3	5/8	30
13	Dual harvest operation	22000	88	25/14	880
14	Non harvester regulator	54000	216	61/8	2160
15	perfect Newholand harvester combine	750	3	5/8	30
16	Harvest height cut zone	15000	60	17/4	600

Farm losses due to grain shattering start before and during harvesting time and included:

**Natural grain shattering:** This kind of grain shattering depends on plant characteristics and climatic and environmental condition. Form of pods, strong of pod node and tolerance, cover pods strength, pod breakability, environment aridity, and temperature and wind velocity. canopy height and stem stiffness may affect the efficiency of seed recovery. Seed losses may also be affected by characteristics of the canopy architecture which are determined by raceme morphology such as pod angles, length, thickness

and width. The relative importance of these canopy characteristics has been described by Morgan *et al.*, (1998).

**Before harvesting grain shattering:** Before harvesting activity and during harvesting time animal activity such as birds and wild animals transportation creating grain shattering that in this stage losses also occur due to biological or physical factors. Fully mature pods of current commercial cultivars are extremely sensitive to opening. In the cultivar Jet Neuf, shatter susceptibility varies significantly in pods from different plants (Child and Huttly, 1999).

**Grain shattering due to hitting with harvest equipments:** During harvest (cutting) due to plant shaking with mechanical tools grain shattering occurs.

**Grain shattering by harvest equipments:** Old and unsuitable equipments during harvest cause grain shattering. Integrity of equipments, good fitness, suitability, operator skill, recognizes the best harvesting time have some effect on declining grain shattering. Low efficient farms lodged plants and even and immature grains have more losses.

**Remain grain in farm after harvest:** Some grain remain in the field after mechanized harvesting which exist in the lower branches of plants. Some pods due to high moisture content not release grain and remained on farms. Some grains don't separate from pods in the wet branches.

**Estimating of grain shattering:** Quantity of grain shattering is not depended on grain production, therefore, grain shattering is not obeying estimating of grain shattering. The quantity of grain shattering is not directly depending on grain production. Estimation of grain shattering in the field is usually 20kg/ha and the situation of bird attack. In late harvesting time of occurring storm it reaches to 500 kg/ha. Estimating of grain shattering in the farm with suitable and equipment almost 60kg/ha and in bad condition up to 200kg/ha have been reported. Grain remained in the farm in good condition of harvesting with good managing almost 40kg/ha and in bad condition 700 kg/ha was reported. In situation which remaining grains in more than 40 kg/ha it can be decrease damage by double harvesting period. Farm losses in fine condition is 120 kg/ha for a farm which produce 1200 kg/ha. If grain production increase up to 2400 kg/ha grain losses is about %5 more grain production less losses with good farm management.

**Abnormal maturity:** Proper harvest management in terms of selecting the proper maturity stage for swathing and combining are very important. As a canola crop nears maturity, it may ripen very quickly. Selecting the correct time to swath and combine canola demands more observations and care than does small grains.

**Time and methods of irrigation, fertilization and weeding:** To determine when a field of canola is ready to swath, examine plants from different parts of the field. The stage of maturity in an evenly maturing field will vary from plant to plant and from area to area within the field. When examining the plants, take into account varying soil types, low lying areas, available soil moisture and exposed early ripening areas.

**Weed interface:** Pre-harvest herbicide applications for weed control may bring the crop in more evenly. But the producer must be ready and able to combine as soon as the crop is ready, otherwise the crop is exposed to shattering risk.

**Delay harvesting time:** The several studies indicate that windrowing too early was the main causes massive yield losses due to incomplete seed development.

**Harvesting in unsuitable time:** There are two preferred methods for harvesting: swathing followed by combining or combining directly. Seed loss may result from either method if done at the improper time. Harvest should occur when the majority of pods are tan and the seeds within are black. This represents a seed moisture level of approximately 10 percent. Shattering may occur if there is a delay in harvest once maturity has been reached.

**Harvesting with unsuitable equipments:** Windrowing rapeseed before the pods are dry can reduce pre-harvest shattering and reduce the anxiety associated with harvesting large areas during the naturally rapid drying cycle.

**Lack of skill of harvester operators**

**Wind shattering:** Canola is easy to cut but makes a bulky, fluffy swath which can be scattered quite easily by the wind. Swathing should be done just below the lowest seed pods, leaving the stubble as high as possible. This will allow the windrow to settle into the stubble and reduce loss from wind movements.

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