

Electronic Journal of Polish Agricultural Universities is the very first Polish scientific journal published exclusively on the Internet, founded on January 1, 1998 by the following agricultural universities and higher schools of agriculture: University of Technology and Agriculture of Bydgoszcz, Agricultural University of Cracow, Agricultural University of Lublin, Agricultural University of Poznan, Higher School of Agriculture and Teacher Training Siedlce, Agricultural University of Szczecin, and Agricultural University of Wrocław.



**ELECTRONIC
JOURNAL
OF POLISH
AGRICULTURAL
UNIVERSITIES**

**2006
Volume 9
Issue 2
Topic
ECONOMICS**

Copyright © Wydawnictwo Akademii Rolniczej we Wrocławiu, ISSN 1505-0297

BRALEWSKI T., HOŁUBOWICZ R. 2006. RETAIL SMALL SEED BAGS WEIGHTS ON THE POLISH MARKET

Electronic Journal of Polish Agricultural Universities, Economics, Volume 9, Issue 2.

Available Online <http://www.ejpau.media.pl/volume9/issue2/art-01.html>

RETAIL SMALL SEED BAGS WEIGHTS ON THE POLISH MARKET

Tomasz W. Bralewski, Roman Hołubowicz
*Department of Horticultural Seed Science and Technology,
August Cieszkowski Agricultural University of Poznan, Poland*

ABSTRACT

In the years 2001-2003 the vegetable seed weights of retail small bags were checked. The actual weights were compared with the declared ones on the seed bags. The research included 956 seed bags of 10 vegetable species: white head cabbage, garden carrot, red beet, onion, cucumber, tomato, radish, head lettuce, common bean and garden pea from 3 Polish seed companies. It was found out that 72.4% of the bags had the actual weights the same as declared on the bag (+/- 5%). The underweights (>5% and >10%) were 9.6% and 3.5% and overweights (>5% and >10%) 17.9% and 10.2%, respectively. Large differences in the received values were found for both the individual years and seed companies. The percentages of in line weights were: for red beet – from 66.7% to 100%, garden carrot – from 50.0% to 83.3%, onion – from 33.4% to 66.7%, white head cabbage – from 16.7% to 90.0%, cucumber – from 69.2% to 100%, tomato – from 26.1% to 100%, common bean – from 72.2% to 100%, garden pea – from 58.0% to 100% and radish – from 77.8% to 88.9%. The biggest underweights were found for garden carrots and cucumber – 22.0% and 18.0%, respectively, whereas the biggest overweights – for head lettuce and white head cabbage: 40.0%; 41.5% and 24.0%; 31.0% respectively. The least maximal underweight and overweights were recorded for red beet – 8.0% and 6.5%, respectively.

Key words: retail bag, seeds, seed company, seed market, seed marketing.

INTRODUCTION

The preliminary research concerning concordance of the declared on the seed bag weights with their actual ones on the Polish market showed many disaccords. It was found out that in the years 1998-2000 about 2/3 of the vegetable seeds small retail bags had underweights [3]. The paper presented here gives the results of complete research on this subject in the years 2001-2003.

MATERIAL AND METHODS

The research on the concordance of the declared seed weights with the actual ones on the small retail bags was carried out in the years 2001-2003. The material for the evaluation was seeds in small retail bags from 3 Polish seed companies operating on the domestic market: 2 of them are important on the professional market, 1 – on the amateur

one. The investigated bags with seeds included 10 species: white head cabbage, garden carrot, red beet, onion, cucumber, tomato, radish, lettuce, common bean and garden pea. In total, the research included 956 retail seed bags.

The experiment consisted on weighting seeds of the each bag and comparing the actual weight with the declared one on the bag. Based on the received results, the investigated bags were divided into 2 groups: the ones in or without accordance with declared weight on the bag ($\pm 5\%$ of the given value) and then their percentages were calculated. Also the maximal under- and overweights were calculated and pointed out.

RESULTS

The carried out investigations showed that on average in the years 2001-2003, out of the tested bags, 72.4% had weights in accordance with the ones declared on the bags ($\pm 5\%$) The underweights were ($>5\%$ and $>10\%$) 9.6% and 3.5%, whereas overweights ($>5\%$ and $>10\%$) 17.9% and 10.2%, respectively. A big variability amongst the collected data was found for the investigated years as well as the companies. The least number of bags with actual weights in accordance with the declared ones was found for the company no. 3: 60.5% (from 49.6% to 71.6%) and for company no. 2: 73.2% (from 63.5% to 87.4%). Such results came from high percentage of overweights ($>5\%$) in the company no. 3 reaching 34.5% and from high percentage of underweights ($>5\%$) in the company no. 2 reaching 20.5%. The company no. 1 had, in turn, the highest percentage of bags with the accordance of the actual weights with the declared ones ($\pm 5\%$): 84.8% (from 78.6% to 94.9%). This came from mostly overweights ($>5\%$) reaching 12.7% of the investigated bags ([tab. 1](#)).

Table 1. Concordance of actual with the declared seed weights of 10 vegetable species available on the Polish market in small bags in the years 2001-2003 from selected seed companies

Company	Concordance of actual with the declared seed weights (%)	Year			Mean
		2001	2002	2003	
No. 1	Overweights $>10\%$	4.1	6.5	19.2	9.9
	Overweights $>5\%$	4.1	14.9	19.2	12.7
	In line	94.9	78.6	80.8	84.8
	Underweights $> 5\%$	1.0	6.5	0.0	2.5
	Underweights $> 10\%$	1.0	3.7	0.0	1.6
Number of tested bags		97	107	99	101.0
No. 2	Overweights $>10\%$	2.9	3.9	2.4	3.1
	Overweights $>5\%$	4.8	3.9	10.2	6.3
	In line	63.5	87.4	68.6	73.2
	Underweights $> 5\%$	31.7	8.7	21.2	20.5
	Underweights $> 10\%$	13.5	1.0	5.5	6.7
Number of tested bags		104	103	127	111.3
No. 3	Overweights $>10\%$	31.8	12.7	0.9	15.1
	Overweights $>5\%$	43.9	25.5	34.5	34.6
	In line	49.6	71.6	60.1	60.5
	Underweights $> 5\%$	6.5	2.9	5.4	4.9
	Underweights $> 10\%$	1.9	0.0	3.6	1.8
Number of tested bags		107	102	110	106.3
Total	Overweights $>10\%$	13.3	7.7	9.5	10.2
	Overweights $>5\%$	18.2	14.7	20.8	17.9
	In line	68.8	79.2	69.3	72.4
	Underweights $> 5\%$	13.0	6.1	9.8	9.6
	Underweights $> 10\%$	5.5	1.6	3.3	3.5
Number of tested bags		308	312	336	318.7

The highest number of companies was selling seeds in the bags, in which the actual weights were the same as the declared ones for tomatoes (the companies no. 1 and 2), the lowest – for seeds of carrot, onion, cucumber and radish (none of the companies). With overweights (>5%), all the investigated companies were selling onion seeds, and with underweights (>5%) – the radish seeds. The company no. 2 was selling the seeds of the highest number of species in bags with underweights. They concerned the seeds of the following species: red beet (22.2%), carrot (16.7%), onion (33.3%), common bean (17.1%), garden pea (42.0%), radish (11.1%) and lettuce (23.4%). The lowest number of underweights was found for the company no. 1. In its case, the underweights concerned common bean (13.9%) and radish (11.1%) ([tab. 2](#)).

The percentage of the actual seed weights in accordance with the declared ones was different for different species. These were: for red beet – from 66.7% (company no. 1) to 100% (company no. 3), carrot – from 50.0% (no. 3) to 83.3% (no. 1 and 2), onion – from 33.4% (no. 2) to 66.7% (no. 3), white head cabbage – from 16.7% (no. 3) to 90.0% (no. 2), cucumber – from 69.2% to 100% (no. 1), tomato – from 26.1% to 100% (no. 1 and 2), common bean – from 72.2% (no. 1) to 100% (no. 3), garden pea – from 58.0% (no. 2) to 100% (no. 1), radish – from 77.8% (no. 2) to 88.9% (no. 1 and 3). A big variability was found for under – and overweights ([tab. 2](#)).

The highest number of big overweights (>10%) was found in the bags from the company no. 2. They concerned the following species: carrot (16.7%), onion (13.1%), cucumber (6.75%), common bean (1.8%) and lettuce (3.3%). In the case of the companies no. 1 and 3 the underweights concerned only 2 species: common bean (13.9%) and tomato (18.5%). The company no. 3 was selling the bags with overweights (>10%) in the highest number of species. They concerned carrot (41.7%), onion (33.3%), white head cabbage (58.3%), cucumber (12.8%), tomato (5.1%) and lettuce (58.3%) ([tab. 3](#)).

Table 2. Concordance with the tolerance of 5% of actual seed weights with the declared ones of 10 vegetable species available on the Polish market in small bags in the years 2001-2003 from selected seed companies. Part I

Species	Concordance of actual with the declared seed weights (%)	Company											
		No. 1				No. 2				No. 3			
		Year			Mean	Year			Mean	Year			Mean
		2001	2002	2003		2001	2002	2003		2001	2002	2003	
Red beet	Overweights	0.0	100.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	In line	100.0	0.0	100.0	66.7	33.3	100.0	100.0	77.8	100.0	100.0	100.0	100.0
	Underweights	0.0	0.0	0.0	0.0	66.7	0.0	0.0	22.2	0.0	0.0	0.0	0.0
Number of tested bags		10	10	10	10.0	9	10	7	-	9	10	12	-
Garden carrot	Overweights	0.0	50.0	0.0	16.7	0.0	0.0	0.0	0.0	100.0	0.0	50.0	50.0
	In line	100.0	50.0	100.0	83.3	50.0	100.0	100.0	83.3	0.0	100.0	50.0	50.0
	Underweights	0.0	0.0	0.0	0.0	50.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0
Number of tested bags		12	12	12	12.0	14	12	12	-	9	12	12	-
Onion	Overweights	33.3	0.0	100.0	44.4	0.0	0.0	100.0	33.3	0.0	0.0	100.0	33.3
	In line	66.7	100.0	0.0	55.6	0.0	100.0	0.0	33.4	100.0	100.0	0.0	66.7
	Underweights	0.0	0.0	0.0	0.0	100.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0
Number of tested bags		9	9	9	9.0	10	10	10	-	10	9	9	-
White head cabbage	Overweights	0.0	50.0	100.0	50.0	0.0	0.0	0.0	0.0	75.0	100.0	75.0	83.3
	In line	100.0	50.0	0.0	50.0	100.0	100.0	70.0	90.0	25.0	0.0	25.0	16.7
	Underweights	0.0	0.0	0.0	0.0	0.0	0.0	30.0	10.0	0.0	0.0	0.0	0.0
Number of tested bags		12	12	10	11.3	10	10	10	-	16	10	16	-
Cucumber	Overweights	0.0	0.0	0.0	0.0	50.0	0.0	0.0	16.7	92.3	0.0	0.0	30.8
	In line	100.0	100.0	100.0	100.0	30.0	100.0	100.0	76.7	7.7	100.0	100.0	69.2
	Underweights	0.0	0.0	0.0	0.0	20.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0
Number of tested bags		10	10	10	10.0	10	10	10	-	13	10	10	-

Explanation: overweight – the weight bigger over 5% from the declared one, underweight – the weight smaller than over 5% from the declared one

Table 2. Concordance with the tolerance of 5% of actual seed weights with the declared ones of 10 vegetable species available on the Polish market in small bags in the years 2001-2003 from selected seed companies. Part II

Species	Concordance of actual with the declared seed weights (%)	Company											
		No. 1				No. 2				No. 3			
		Year			Mean	Year			Mean	Year			Mean
		2001	2002	2003		2001	2002	2003		2001	2002	2003	
Tomato	Overweights	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.8	100.0	0.0	43.6
	In line	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	38.4	0.0	40.0	26.1
	Underweights	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.8	0.0	60.0	30.3
Number of tested bags			10	10	10		10	10	10		13	10	10
Common bean	Overweights	16.7	25.0	0.0	13.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	In line	66.6	50.0	100.0	72.2	100.0	100.0	48.6	82.9	100.0	100.0	100.0	100.0
	Underweights	16.7	25.0	0.0	13.9	0.0	0.0	51.4	17.1	0.0	0.0	0.0	0.0
Number of tested bags			6	16	10		10	10	37		9	10	14
Garden pea	Overweights	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	8.3
	In line	100.0	100.0	100.0	100.0	100.0	41.7	33.3	58.0	67.7	100.0	75.0	90.6
	Underweights	0.0	0.0	0.0	0.0	0.0	58.3	67.7	42.0	33.3	0.0	0.0	11.1
Number of tested bags			10	10	10		12	12	12		9	10	8
Radish	Overweights	0.0	0.0	0.0	0.0	0.0	0.0	33.3	11.1	0.0	0.0	33.3	11.0
	In line	100.0	66.7	100.0	88.9	67.7	100.0	67.7	77.8	100.0	66.7	67.7	88.9
	Underweights	0.0	33.3	0.0	11.1	33.3	0.0	0.0	11.1	0.0	33.3	0.0	11.1
Number of tested bags			9	9	9		9	9	9		9	9	9
Head lettuce	Overweights	0.0	0.0	0.0	0.0	0.0	40.0	0.0	13.3	100.0	50.0	50.0	66.7
	In line	100.0	100.0	100.0	100.0	50.0	40.0	100.0	63.3	0.0	50.0	50.0	33.3
	Underweights	0.0	0.0	0.0	0.0	50.0	20.0	0.0	23.4	0.0	0	0.0	0.0
Number of tested bags			9	9	9		10	10	10		10	12	12

Explanation: overweight – the weight bigger over 5% from the declared one, underweight – the weight smaller than over 5% from the declared one

Table 3. Concordance with the tolerance of 10% of actual seed weights with the declared ones of 10 vegetable species available on the Polish market in small bags in the years 2001-2003 from selected seed companies. Part I

Species	Concordance of actual with the declared seed weights (%)	Company											
		No. 1				No. 2				No. 3			
		Year			Mean	Year			Mean	Year			Mean
		2001	2002	2003		2001	2002	2003		2001	2002	2003	
Red beet	Overweights	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	In line	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Underweights	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number of tested bags			10	10	10		9	10	7		9	10	12
Garden carrot	Overweights	0.0	25.0	0.0	8.3	0.0	0.0	0.0	0.0	100.0	0.0	25.0	41.7
	In line	100.0	75.0	100.0	91.7	50.0	100.0	100.0	83.3	0.0	100.0	75.0	58.3
	Underweights	0.0	0.0	0.0	0.0	50.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0
Number of tested bags			12	12	12		14	12	12		9	12	12
Onion	Overweights	33.3	0.0	100.0	11.1	0.0	0.0	0.0	0.0	0.0	0.0	100.0	33.3
	In line	66.7	100.0	0.0	88.9	60.0	100.0	100.0	86.7	100.0	100.0	0.0	66.7
	Underweights	0.0	0.0	0.0	0.0	40.0	0.0	0.0	13.3	0.0	0.0	0.0	0.0
Number of tested bags			9	9	9		10	10	10		10	9	9
White head cabbage	Overweights	0.0	0.0	100.0	33.3	0.0	0.0	0.0	0.0	50.0	100.0	25.0	58.3
	In line	100.0	100.0	0.0	66.7	100.0	100.0	100.0	100.0	50.0	0.0	75.0	41.7
	Underweights	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number of tested bags			12	12	10		10	10	10		16	10	16
Cucumber	Overweights	0.0	0.0	0.0	0.0	30.0	0.0	0.0	10.0	38.5	0.0	0.0	12.8
	In line	100.0	100.0	100.0	100.0	50.0	100.0	100.0	83.3	61.5	100.0	100.0	87.2
	Underweights	0.0	0.0	0.0	0.0	20.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0
Number of tested bags			10	10	10		10	10	10		13	10	10

Explanation: overweight – the weight bigger over 10% from the declared one, underweight – the weight smaller than over 10% from the declared one

Table 3. Concordance with the tolerance of 10% of actual seed weights with the declared ones of 10 vegetable species available on the Polish market in small bags in the years 2001-2003 from selected seed companies. Part II

Species	Concordance of actual with the declared seed weights (%)	Company											
		No. 1				No. 2				No. 3			
		Year			Mean	Year			Mean	Year			Mean
		2001	2002	2003		2001	2002	2003		2001	2002	2003	
Tomato	Overweights	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	0.0	0.0	5.1
	In line	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	69.2	100.0	60.0	76.4
	Underweights	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	0.0	40.0	18.5
Number of tested bags			10	10	10		10	10	10		13	10	10
Common bean	Overweights	16.7	25.0	0.0	13.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	In line	66.6	50.0	100.0	72.2	100.0	100.0	94.6	98.2	100.0	100.0	100.0	100.0
	Underweights	16.7	25.0	0.0	13.9	0.0	0.0	5.4	1.8	0.0	0.0	0.0	0.0
Number of tested bags			6	16	10		10	10	37		9	10	14
Garden pea	Overweights	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	In line	100.0	100.0	100.0	100.0	100.0	91.7	58.3	83.3	100.0	100.0	100.0	100.0
	Underweights	0.0	0.0	0.0	0.0	0.0	8.3	41.7	16.7	0.0	0.0	0.0	0.0
Number of tested bags			10	10	10		12	12	12		9	10	8
Radish	Overweights	0.0	0.0	0.0	0.0	0.0	0.0	33.3	11.1	0.0	0.0	0.0	0.0
	In line	100.0	100.0	100.0	100.0	100.0	100.0	66.7	88.9	100.0	100.0	100.0	100.0
	Underweights	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number of tested bags			9	9	9		9	9	9		9	9	9
Head lettuce	Overweights	0.0	0.0	0.0	0.0	0.0	40.0	0.0	13.3	100.0	25.0	50.0	58.3
	In line	100.0	100.0	100.0	100.0	90.0	60.0	100.0	83.4	0.0	75.0	50.0	41.7
	Underweights	0.0	0.0	0.0	0.0	10.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0
Number of tested bags			9	9	9		10	10	10		10	12	12

Explanation: overweight – the weight bigger over 10% from the declared one, underweight – the weight smaller than over 10% from the declared one

The carried out research showed big differences amongst maximal underweights and overweights for the individual species coming from companies and years of the investigation. The biggest maximal underweights were found in the case of carrot (22%) and cucumber (18%) (company no. 2), and overweights – lettuce: 40% and 41.5% and cabbage: 24% and 31.0% (company no. 3), respectively. The smallest maximal under – and overweights were found in the case of red beet (8% and 6.5%, respectively) ([tab. 4](#)).

Table 4. Maximal actual seed overweights and underweights in comparison with the declared ones of 10 vegetable species available on the Polish market in small bags in the years 2001-2003 from selected seed companies

Species	Maximal (%)	Company								
		No. 1			No. 2			No. 3		
		Year								
		2001	2002	2003	2001	2002	2003	2001	2002	2003
Red beet	Overweight	-	6.5	-	-	-	-	-	-	-
	Underweight	-	-	-	8.0	-	-	-	-	-
Number of tested bags		10	10	10	9	10	7	9	10	12
Garden carrot	Overweight	-	16.4	-	-	-	-	16.0	-	9.6
	Underweight	-	-	-	22.2	-	-	-	-	-
Number of tested bags		12	12	12	14	12	12	9	12	12
Onion	Overweight	12.4	-	12.2	-	-	7.7	-	-	16.0
	Underweight	-	-	-	12.0	-	-	-	-	-
Number of tested bags		9	9	9	10	10	10	10	9	9
White head cabbage	Overweight	-	5.3	14.0	-	-	-	24.0	31.0	12.0
	Underweight	-	-	-	-	-	7.5	-	-	-
Number of tested bags		12	12	10	10	10	10	16	10	16
Cucumber	Overweight	-	-	-	22.0	-	-	26.0	-	-
	Underweight	-	-	-	18.0	-	-	-	-	-
Number of tested bags		10	10	10	10	10	10	13	10	10
Tomato	Overweight	-	-	-	-	-	-	15.0	6.6	-
	Underweight	-	-	-	-	-	-	15.0	-	11.0
Number of tested bags		10	10	10	10	10	10	13	10	10
Common bean	Overweight	14.0	20.9	-	-	-	-	-	-	-
	Underweight	12.0	16.5	-	-	-	10.9	-	-	-
Number of tested bags		6	16	10	10	10	37	9	10	14
Garden pea	Overweight	-	-	-	-	-	-	-	-	6.3
	Underweight	-	-	-	-	12.3	15.8	7.4	-	-
Number of tested bags		10	10	10	12	12	12	9	10	8
Radish	Overweight	-	-	-	-	-	20.2	-	-	6.1
	Underweight	-	5.4	-	9.0	-	-	-	6.0	-
Number of tested bags		9	9	9	9	9	9	9	9	9
Head lettuce	Overweight	-	-	-	-	18.0	-	40.0	41.5	15.0
	Underweight	-	-	-	15.0	6.0	-	-	-	-
Number of tested bags		9	9	9	10	10	10	10	2	2

DISCUSSION

Szwochertowska [5] investigated accordance of actual and declared seed weights for vegetable seeds coming from selected Polish seed companies in the trade season 1997/98. She found out that 63.0% of the tested bags had underweights and 36.0% – overweights. She, however, had not taken any tolerance in the weights, so in her test only 1% of small retail bags had the precisely declared seed weights. The similar investigations carried out by Harac [2] in the trade season 1998/1999 showed that 30.4% of the tested bags had underweights over 5%. The found out by the authors result of 9.6% of underweights >5% shows a significant improvement in this area which had taken place on the Polish market since 2000. This came out, as one can suppose, from modernization and exchange of facilities for bagging seeds in some of the Polish seed companies. This is concerned, in turn, by relatively low number of under- and overweights above 10% of the investigated bags: 3.5% and 10.2%, respectively. Also the results concerning the maximal underweights prove that the situation in this matter on the market has been improving. The received by the authors' results in the years 2001-2003 showed that these underweights did not often exceed 5% of

the declared weights and in two maximal cases they were 18.0% and 22.0% for cucumber and carrot, respectively. Haras [2] in 10 species has pointed out numerous underweights exceeding 5% and hesitating from 7.8% to 49.3%. He has also found maximal underweights exceeding 20% in 4 species (red beet, onion, tomato and beans). Also Szwochertowska [5] found in her investigations numerous cases of underweights exceeding 5% of the declared value in 8 species of vegetables. The values of cited by her maximal underweights hesitates from 6.7% to 61.5% of the declared value. The authors also found that in 7 species out of 10 investigated ones the found maximal overweights were bigger than the maximal ones. In the results of the investigations done by Szwochertowska [5] overweights were bigger than underweights in half and by Haras [2] in 9 out of 10 investigated species. Both Szwochertowska [5] and Haras [2] found more underweights than overweights, whereas the authors' results were the opposite.

Both Szwochertowska [5] and Haras [2] mentioned that underweights could be affected by the conditions, in which the seeds were stored during the trade season. Indeed, there have been a number of publications proving that storing conditions can affect losing weights of seeds [1, 4]. According to the authors, seeds properly prepared by a seed company for selling, mostly properly dried and packed, can change their weight only in a small extend. It therefore cannot be concluded that storing conditions is the main reason of all found cases of disaccords of weights in the investigated retail seed bags.

Despite all proved differences amongst the investigated seed companies, based on the carried out research, it can be said that the situation on the Polish seed market, in terms of the accordance of actual weights with declared ones in retail small bags, after 2000 significantly improved. The found disaccords, moreover, came mostly from overweights, not underweights.

CONCLUSIONS

1. In the years 2002-2003, 72.4% small retail bags of seed of vegetables had the actual weights the same as declared on the bag (+/- 5%). The underweights (>5% and >10%) were 9.6% and 3.5% and overweights (>5% and >10%) 17.9% and 10.2%, respectively. Large differences in the received values were found for both the individual years and seed companies.
2. The percentages of in line weights were: for red beet – from 66.7% to 100%, garden carrot – from 50.0% to 83.3%, onion – from 33.4% to 66.7%, white head cabbage – from 16.7% to 90.0%, cucumber – from 69.2% to 100%, tomato – from 26.1% to 100%, common bean – from 72.2% to 100%, garden pea – from 58.0% to 100% and radish – from 77.8% to 88.9%.
3. The biggest underweights were found for garden carrot and cucumber – 22.0% and 18.0%, respectively, whereas the biggest overweights – for head lettuce and white head cabbage: 40.0%; 41.5% and 24.0%; 31.0% respectively. The least maximal underweights and overweights were recorded for red beet – 8.0% and 6.5%, respectively.

REFERENCES

1. Grzesiuk S., Kulka K., 1981. Fizjologia and biochemia nasion [Seed Physiology and Biochemistry]. PWRiL, Warszawa [in Polish].
2. Haras P., 2000. Jakosc nasion roslin warzywnych w opakowaniach jednostkowych [Vegetable seeds quality in small retail bags]. Praca magisterska zrealizowana w Katedrze Nasiennictwa and Szkółkarstwa Ogrodniczego Akademii Rolniczej w Poznaniu [M.Sc. thesis realised at Department of Horticultural Seed Science, Technology and Nursery of Agricultural University of Poznań] [in Polish].
3. Hołubowicz R., Bralewski T.W., Haras P., Szwochertowska J., 2002. Jakosc nasion wybranych gatunków warzyw w obrocie detalicznym w Polsce [Seed quality of selected vegetable species in retail trade in Poland]. Mat. Symp. Sekcji HRiN PTNO. "Hodowla and nasiennictwo roslin ogrodniczych", 21-22 maja 2002 r., AR Kraków, 57 [in Polish].
4. Lityński M. (red.), 1970. Biologia nasion and nasiennictwo [Seed Biology and Seed Science and Technology]. PWN, Poznań [in Polish].
5. Szwochertowska J., 1999. Masa nasion roslin ogrodniczych w opakowaniach jednostkowych w obrocie detalicznym [Horticultural seed weights in small retail bags]. Praca magisterska zrealizowana w Katedrze Nasiennictwa and Szkółkarstwa Ogrodniczego Akademii Rolniczej w Poznaniu [M.Sc. theses realised at Department of Horticultural Seed Science, Technology and Nursery of Agricultural University of Poznań] [in Polish].

Roman Hołubowicz
Department of Horticultural Seed Science and Technology,
August Cieszkowski Agricultural University of Poznan, Poland
Baranowo, 62-081 Przemierowo, Poland

[Responses](#) to this article, comments are invited and should be submitted within three months of the publication of the article. If accepted for publication, they will be published in the chapter headed 'Discussions' and hyperlinked to the article.

[Main](#) - [Issues](#) - [How to Submit](#) - [From the Publisher](#) - [Search](#) - [Subscription](#)