

SPECIFICS OF ORNAMENTAL SEEDS PRODUCTION IN POLAND BASED ON CHINA ASTER (*CALLISTEPHUS CHINENSIS* NEES) AND PANSY (*VIOLA WITTRUCKIANA* HORT.)

Roman HOŁUBOWICZ, Anna BORYSIK

Department of Seed Science and Technology, Poznań University of Life Sciences, Baranowo,
62-081 Przeźmierowo, Poland, seed@au.poznan.pl

Keywords: ornamental seeds, China aster seeds, pansy seeds, ornamental seeds production

Abstract: Poland has been a serious producer and seller of seeds of ornamental plants in the European Union. The aim of this work was to describe specifics of Polish flower seeds production based on two very important and different in seed production species: China aster (*Callistephus chinensis* Nees) and pansy (*Viola wittrockiana* hort.). The research included their seed production technology and profitability. It was based on the detailed analyses of 12 seed growers' farms located in western (near Wschowa) and northern (near Brześć Kujawski) Poland, the most important ornamental seed production areas in the country. The main differences in seed production technology concerned time of seeds sowing, risk of killing plants by winter, healthy status of the received plants, number of off-type selections, frequency of seed harvesting, seed yields and germination capacity of the received seeds. The profitability of China aster and pansy was 865 zł and 515 zł (1 euro=3.2 zł)/0.1 ha, respectively. Although, the seed yield of China aster was high, and seed harvest easy to carry out, the received seeds did not germinate well and thereby the received price for seeds was low. In the case of pansy seeds, it was opposite: the crop was risky due to winter killing of the plants, seed yield was low, costs of the seeds harvest were high, but the seeds germinated well and the price paid for the seeds was high.

Poland has been a serious producer and seller of seeds of ornamental plants in the European Union (EU). There are about 50 tons of ornamental species seeds coming on the Polish seed market every year, out of which about 30 tons are produced in our country (Hołubowicz et al., 2005).

Since the late 80s, the flower seed sector in Poland has been based only on a few companies mostly trading seeds (Duczmal, 1997). Like in other countries of the EU in flower seed industry, there has been neither a national list of cultivars nor a filed certification obligation.

However, due to cheaper vegetables coming from supermarkets, the society's interest for flowers has been increasing. In Poland, there are still seed growers specializing in flower seed production and domestic companies like "W. Legutko", "Polan" or "Rekwait" specialize in flower seeds. In recent years, their activities switched from breeding and production into seed marketing (Bralewski and Hołubowicz, 2007). The aim of this work was to describe specifics of the production of the Polish seed sector based on two very important and different in seed production species: China aster (*Callistephus chinensis* Nees) and pansy (*Viola wittrockiana* hort.).

MATERIALS AND METHODS

The research was carried out on two ornamental plant species: China aster (*Callistephus chinensis* Nees) and pansy (*Viola wittrockiana* hort.). It included their seed production technology and profitability. It was based on the detailed analyses of 12 seed growers' farms located in western (near Wschowa) and northern (near Brześć Kujawski) Poland, the most important ornamental seed production areas in the country. Their production was contracted on the area of 10 ars (0.1 ha) for the biggest horticultural seed companies operating in the country. The first part of the research pointed out the most important differences in technology of seed production. These were: seed sowing time, risk of killing the plants during winter, healthy status of received plants affecting costs of their protection, number of off-type selections, the way and frequency of seeds harvest, seed yield and possibility of receiving seeds with high germination capacity (above 80 %).

The second part of the research pointed out profitability of the production. At first, it focused on the most important elements of costs of production such as: seeds or transplants, fertilizers and pesticides, use of machines (including fuel) or services done by others, transport and other items (garden soil, pots, etc). When the sum of these costs was subtracted from the value received from the seeds, it created a gross income. Then it included also electric energy, soil tax and cost of the used water. When it was subtracted from the gross income, it created an agricultural income. At the end it also included the cost of the used human labour. When this was subtracted from the agricultural income, it created a final profit. The oil cost was taken 4.4 zł per 1 liter (1 euro = 3.2 zł). The price of 1 KW of energy was 0.475 zł. The price of 1 hour of human labour was 5 zł. The mean values were calculated for each species out of the 6 analyzed farms.

RESULTS AND DISCUSSIONS

The research proved that there were serious differences in seed production of China aster and pansy (Table 1). In Poland, the China aster seeds are sown in the spring, whereas the pansy ones in the autumn. For this reason, for the latter there is a probability of being damaged or even killed during overwintering. Later on, in the vegetation period, China aster plants have still serious problems with some diseases, out of which wilt caused by the fungus *Fusarium* and virus diseases are the biggest ones. The pansy health status of the recorded plants was much less troublesome for seed growers than the first species. The genetic purity in China aster seed production has been creating much less problems than in the case of the second species. For this reason, the off-type selections must be done more often for the pansy seed plantations. However, the biggest differences in seed production concerned frequency of harvesting seeds: China aster seeds can be basically easily collected by a few times seed hand harvest, whereas pansy seeds must be collected every second day for at least 3 months. This creates a big problem for high costs of hand labour and practically limits the business in Poland to family farms where labour comes from one's own family members. The seed yield of China aster in Poland, due to unfavourable weather conditions in September is low and germination of seeds in some years cannot meet the company's quality standards. The pansy seeds' yield in the Polish conditions is high and the seeds have good germination.

Table 1

Main differences in the technology used for seed production of China aster and pansy in Poland in 2007

Specifications	China aster	Pansy
Tim of seeds sowing	spring	autumn of the previous year
Risk of killing by winter	no	yes
Healthy status of plants	medium-low	high
Off-type selection	2-3	5-8
Seed harvest	a few times	every 2 days for 3 months
Seed yield	low	high
Seeds highly germinating	very difficult	easy

The specifics of production of seeds of China aster and pansy had the biggest effect on their profitability. The table 2 gives the most important elements of the costs of the both species. The value of the produced seeds was over twice bigger for pansy seeds than for the latter species. The seeds used for sowing were almost five times more expensive for pansy than for China aster. The costs of used fertilizers and pesticides to control crops and use of machines were basically the same. The cost of transport was much higher for pansy than for China aster production. As the costs of electric energy, soil tax and water used for production were almost the same; the agricultural income was 3 times higher for pansy than for China aster seeds. However, this calculation did change dramatically after subtracting the cost of hand labour used for the seed harvest. The value of the labour used for collecting pansy seeds was almost 7 times higher than for the China aster seeds. For this reason, the profit was bigger for the China aster seeds than for the pansy seeds (Table 2).

Table 2

Economical analyses (zł/0.1 ha) and profit of the China aster and pansy seed production in Poland in 2007

Specifications	China aster	Pansy
Value of the production	1956.67	4840.00
Seeds or transplants	11.67	107.92
Fertilizers and pesticides	255.25	251.48
Use of machines (fuels) or service	192.07	192.07
Transport	21.67	36.67
Other items of the costs	38.06	38.06
Gross income	1437.95	4213.8
Electric energy	5.86	5.93
Soil tax	6.92	6.74
Water used	10.58	11.10
Agricultural income	1414.59	4190.09
Human labour	548.67	3674.84
Profit	865.92	515.25

The ornamental seed production has become more and more important in the world (McDonald, Kwong, 2005, Le Buanec, 2007). It is so, because in the developed countries people work less than before having thereby more time for recreation and rest. Many of them spend it in their gardens where ornamental plants are a crucial part of the modern landscape. The home gardeners in Poland are nowadays more interested in flowers and ornamental trees than growing vegetables (Loftus and Hołubowicz, 2006).

The received results showed clearly that seeds of some ornamental species can be successfully produced only by well experienced growers. The big knowledge about plant diseases, off-type selection and biology is needed when producing seeds of flowers (Korohoda, 1972). Moreover, in the case of China aster in Poland, there are also significant limits in its production due to poor health status of plants and problems with the germination

of the received seeds (Grzesik et al., 1998). For this reason, in the strategies of the Polish seed companies, moving the China aster seeds production to other more convenient areas with better climatic conditions has become a routine procedure. These countries are: China, Tanzania and India (Hołubowicz and Bralewski, 2004, 2008).

In case of pansy seeds, the market is increasing too. However, the specifics of this species consists on keeping the high level of genetic purity, which could be easily lost when there is not a proper off-type selection in the field. The carried out research proved that pansy seeds can be easily produced in Poland (Agnieszka and Holubowicz, 2008). Moreover, the species is high yielding with good quality seeds. This was also confirmed by Korohoda (1972).

The economic analyses showed that profitability of two species was different. If you included all costs, the profitability of the China aster seeds production would be about 40 % higher than the pansy seeds. That was because the cost of hand labour for seeds harvest was 7 times bigger for pansy than for the China aster seeds. This highly labour consuming species in production have remained in Poland a domain of small family farms (Hołubowicz et al. 2005).

REFERENCES

1. Agnieszka, R., R. Hołubowicz, 2008, Effect of Pansy (*Viola x wittrockiana* gams) Seeds Colour and Size on their Germination, *Notulae Botanicae Horti Agrobotanici Cluj-Napoca*, 36(2), 47-50.
2. Bralewski, T. W., R. Hołubowicz, 2007, Specifics of management of Polish horticultural companies. 42nd. Croatian & 2nd Intern. Symp. Agric., Opatija, Croatia, 13-16 Feb. 2007, 204.
3. Duczmal, K. W., 1997, Crucial problems of the Polish seed industry. *Hod. Roślin Nas*, A special issue, 2- 10 (in Polish).
4. Grzesik, M., Górnik K., Chojnowski M. G., 1998, Effect of harvest time on the quality of *Callistephus chinensis* Ness cv, Aleksandra seeds collected from different parts of plant. *Seed Sci. & Technol.* 26:263-265.
5. Hołubowicz, R., T. W. Bralewski, 2004, Strategies of developing Polish plant breeding and seed production companies after Poland joins the European Union, *Folia Univ. Agric. Stetin.* 239:127-130 (in Polish).
6. Hołubowicz, R., T. W. Bralewski, 2008, Changes in organization of the Polish seed sector after 1989. *Proc. 43th. Croatian and 3 rd. Intern. Symp. on Agric.*, Opatia, Croatia, 412-415.
7. Hołubowicz, R., T. W. Bralewski, W. Legutko, 2005, Ornamental seed industry in Poland. *Zesz. Prob. Post. Nauk Roln.* 504:601-610 (in Polish).
8. Korohoda, J., 1972, Seed production of ornamental plants, PWRiL, Warsaw (in Polish).
9. Le Buanec, B., 2007, Evolution of the seed industry during the past three decades, *Seed Test. Inter.* 134:6-10.
10. Loftus, S., R. Hołubowicz, 2006, A view of Polish seed industry – part I.
11. McDonald, M. B., F. Y. Kwong, 2005, Flower seeds: biology and technology, CABI Publ. Co., UK, 225-247.
12. http://www.worldgrower.com/features_story.ehtml?o=201