

Farmers' knowledge, attitude and practices in integrated apple production in central Poland

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ABSTRACT

The country wide programme on integrated fruit production (IFP) – apples was initiated in 1990 by releasing technical recommendations by the staff of Research Institute of Pomology and Floriculture (RIPF) in Poland. After the initial expansion among orchard owners, the concept of IFP met some constraints. Only 14-16% of table apples were produced annually in the years 2000–2004 according to IFP principles. The primary objective of our academic project was to identify constraints in the implementation of IFP-apples, the only widely promoted programme on integrated crop and pest management, to be used as a model for other projects in Poland. Two regions in central Poland were selected for studies on the suitability of the pro-ecological technical recommendations for farmers' implementation; evaluation of the quality of training; access to professional extension service; attitude and expectations of farmers to producers' group

organization and economics of IFP. Standard surveys on: knowledge, attitude and practices (KAP surveys) were carried out in 2002 and 2003 among randomly selected orchard owners in Grójec district as the leading and specialized region in modern fruit production in Poland and Warka district with traditionally managed orchards switching to modern technology, both located in central Poland. A number of limitations in the training of farmers as well their knowledge and the attitude to IFP were identified with farmers' suggestions for improvement. The lack of involvement among various groups of shareholders and co-ordination of activities at three levels: i.e. at upstream level (governmental), at farmers' field level and at downstream or consumers' level were identified as the major factor hampering wide implementation of IFP in Poland.

During the project data evaluation, the value of collected data was upgraded with wide acceptance of the sustainable production principles after the accession of Poland to the European Union in 2004. The survey results should be presently consider as the base line for future evaluation of the progress made by widely implemented national programme on integrated agriculture and horticulture production initiated by the recent Government initiatives. The newly established Parliament law (Dec. 2003) and the Ministry of Agriculture and Rural Development decrees (June 2004) on integrated production as well as the growing interest of wholesale markets and supermarkets in certified products shall stimulated expansion of IFP.

Abbreviations:

ICPM – Integrated crop and pest management

IFP – Integrated fruit production

KAP – Knowledge, attitude, practices

RIPF – Research Institute of Pomology and Floriculture

INTRODUCTION

The programme on Integrated Fruit Production (IFP) commenced in 1991 by releasing technical recommendations by the staff of Research Institute of Pomology and Floriculture (RIPF) at Skierniewice in Poland in the first five years concentrated on apple production. Up to 2001, 1180 farmers organized in 36 producers' groups carried out IFP on the area of 7 300 ha of apple orchard located in various regions of Poland, contributing to 14% of the total table apple production (Niemczyk 2002). This share has increased to 16.5% in 2004 (Niemczyk 2004). The first IFP programme in Poland was based on the approach from the bottom of the farm level because of specific situation in the past imposed by the government level and not accepted by farmers, namely collectivisation and

pressure to organize farmers' cooperatives directed by the central government and party institutions (Niemczyk 2001, Dąbrowski 2003).

The principles of IFP development and implementation proposed for the European Union (EU) countries, but also adopted by Australia and New Zealand, were built on the fruit producers' groups or organizations responsible for: training, joint supplies of production inputs, fruit marketing and interactions with wholesale systems, the parliament and governmental institutions (Niemczyk 2000, Walker et al. 2001).

The initial expansion of IFP groups in the 1990-ties in Poland was supported by a special programme of the Ministry of Agriculture by the so-called „mini grants” of 15 000-40 000 EURO to regional extension service. However, in the late nineties, the programme met some constraints (Niemczyk 2002).

The staff of Department of Applied Entomology, Warsaw Agricultural University initiated regular studies on the constraints in the IFP implementation by farmers growing apples, black currant, strawberries and sour cherries in 1998. It was decided that the experience gained during the implementation of the IFP-apples, the only national wide programme on integrated crop and pest management, would be used as a model for other future projects in Poland (Dąbrowski 2000).

MATERIAL AND METHODS

There is presently a common consensus that implementation of new crop and pest management (ICPM) programmes should be based on our knowledge of farmer's perception of a pest problem, the pest control decision – making process and the likelihood of the adoption of new technologies and techniques. The behaviour of a farmer is an important variable because knowledge of past behaviour of farmers may help predict how they will behave in the future (Wearing 1988). One method that is used in social sciences to obtain information on farmers' interactions and perception is that of using a specially design questionnaire and personal interviews with randomly selected farmers. The standard questionnaires including six criteria; i.a. characteristics, knowledge, beliefs, attitudes, behaviour and production practices were used by various authors interesting in the adoption of ICPM programmes by farmers (Reichelderfer 1989, Saadabi et al. 1997).

The data presented herewith are the results of surveys carried out in the 2002 – 2003 period on farmers' knowledge, attitudes and practices related to IFP (apples) in the two regions, where a number of training courses and farmers' professional gathering were organized to publicized integrated production of fruits. Orchard owners of both regions, Grójec and Warda districts located in central Poland, are commonly recognized as highly specialized in fruit production. The Grójec region orchards are leading in apple production of 600 000-700 000 t

annually, contributing to 30% of total country harvest. Orchards in the Warka region used to be under traditional management but recently a number of them accepted new apple cultivars and adopted modern technologies.

Sampled apple producers of both regions were personally interviewed using structured questionnaires. The interviews were carried out in the two stages:

1. randomly selected 26 participants of the IFP course organized by the Research Institute of Pomology and Floriculture (RIPF), who were or were not members of the IFP groups. Because some questions were not answered, only 21 questionnaires were taken for final data evaluation;
2. on farm interviews with selected orchard owners in both regions.

Because only small fraction of selected farmers were involved in the IFP, the authors requested assistance from the IFP local instructors to provide list of the IFP farmers. In total, 67 randomly selected orchard owners were interviewed on their farms.

The questionnaire was designed to provide information on general characteristics of farms and producers, the extent of apple production, farmers' knowledge, management attitudes and practices related to production and plant protection technologies used. Special emphasis was given to the needs related to the content and quality of training of farmers in IFP.

Frequency distribution and cross tabulation were employed as data analysis tools with help of Microsoft Excel programme.

RESULTS

General characteristics of fruit producers

Out of 88 interviewed farmers, 13 were women involved in decision making. Up to 55 farmers represented the major age group of 35-55 years. The university degree was recorded for 26% orchard owners; the middle-level education by 55%; lower professional – 17% and 2% of basic school education. All interviewed farmers regularly read horticultural journals, with the majority – 86% reading “Sad Nowoczesny” (“Modern Orchard”); 54.5% “Owoce, Warzywa i Kwiaty” (“Fruits, Vegetables and Flowers”) and 50% “Hasło Ogrodnicze” (“Horticulture Entry”), indicating that some farmers read even 2-3 journals.

Up to 55% of sampled farmers were registered members of the IFP groups and 63% were members of other organizations of orchard owners. Out of 88 interviewed farmers, 39% followed the IFP procedures. They were highly specialized producers – 31% of farm' total area was under orchard and in 50% of farms – only under apple trees plantations (Fig. 1). The comparison of orchard sizes under different management in the four area groups showed that the majority of all orchards under IFP system occurred in the group of 10-20 ha and larger than 20 ha (Fig. 2). An average yield of 30-40 t per ha was harvested by 38.2% of IFP

growers and by 16.0% of the IFP farmers. Higher yield than 40 t per ha was recorded by 21% of the IFP growers and only by 16% of non-IFP farmers (Fig. 3). Less than 1% of the interviewed IFP farmers acknowledged yield lower than 30 t per ha. The majority of farmers followed the recommendations on proper formation and pruning of trees and maintenance of soil cover in their orchards.

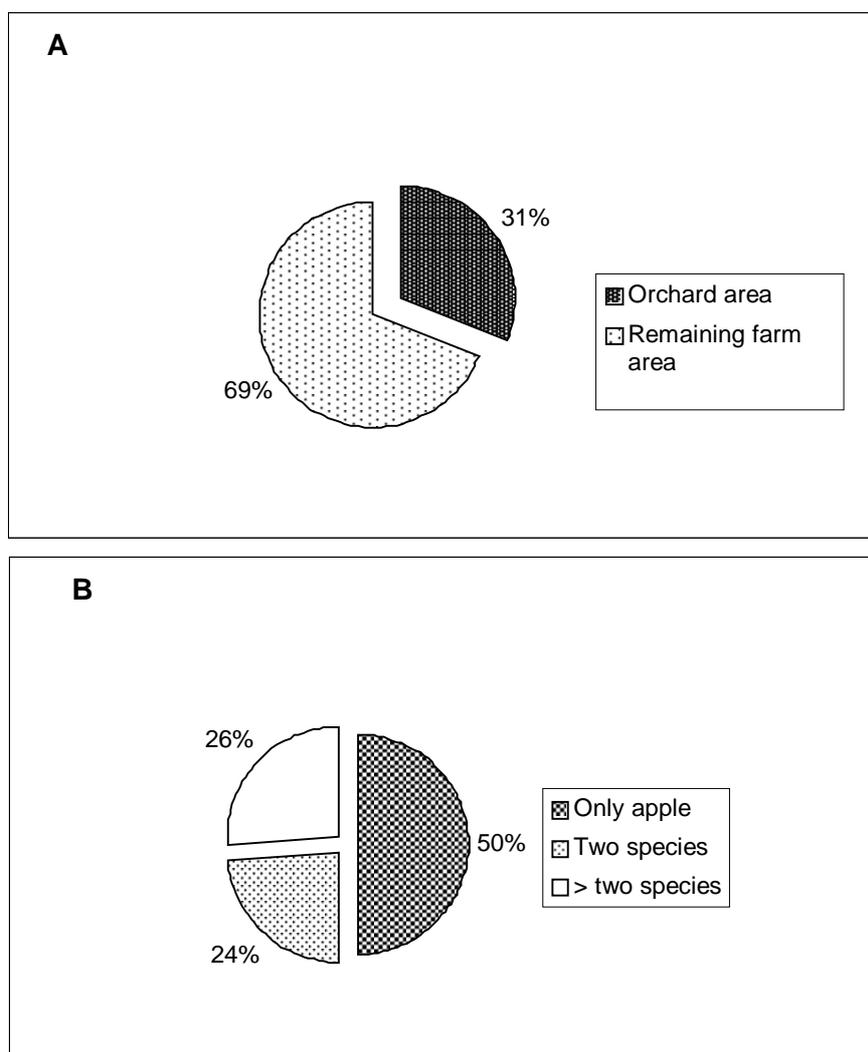


Figure 1. General characteristic of farms own by interviewed orchard growers: A – share (%) of orchard area in the total farm area; B – share (%) of apple orchards, and orchards with two or more than two species grown in total orchard area

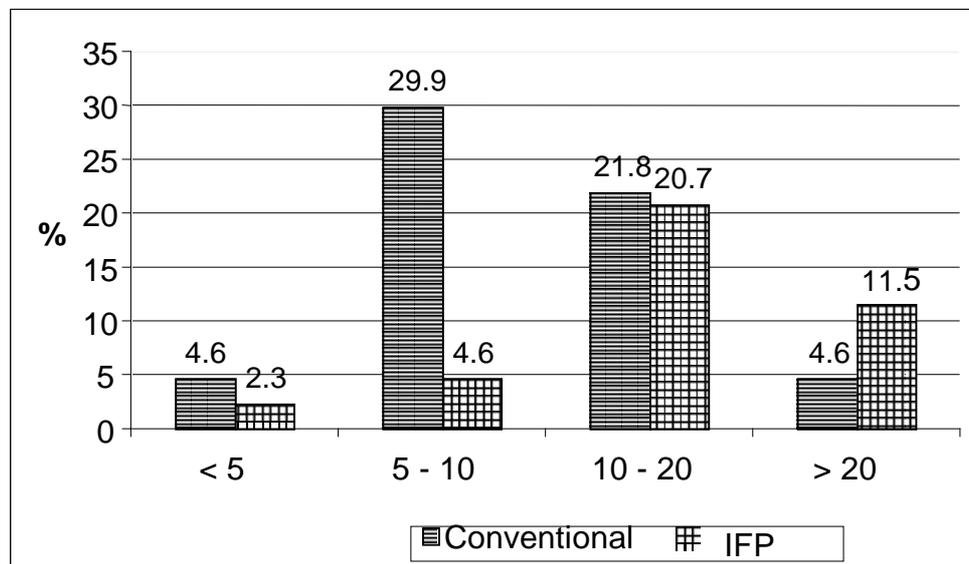


Figure 2. Share (%) of IFP and conventionally managed orchards in the four farm area groups

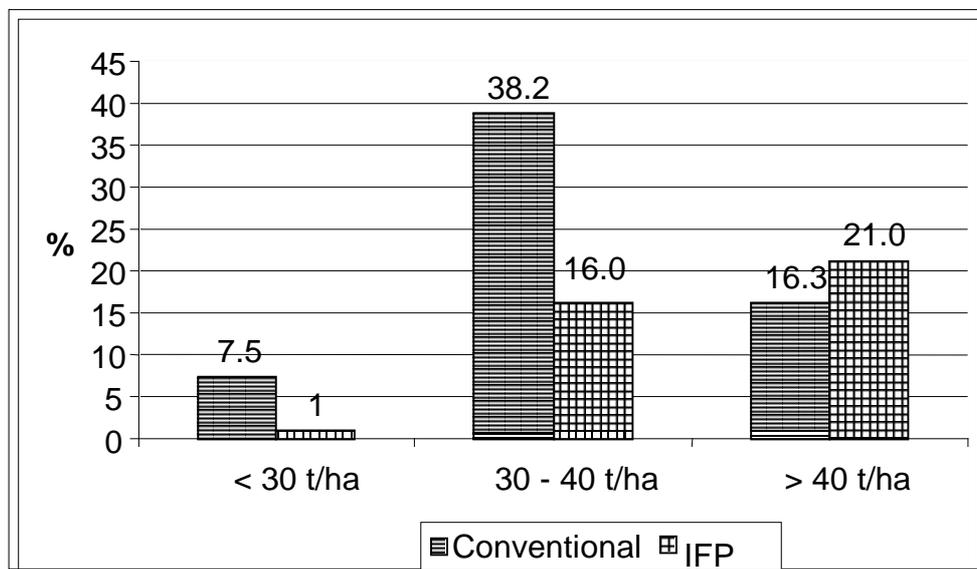


Figure 3. Share of IFP and conventionally managed orchards in the three groups of farmers harvesting: less than 30 t per ha; 30–40 t per ha and more than 40 t per ha of apples

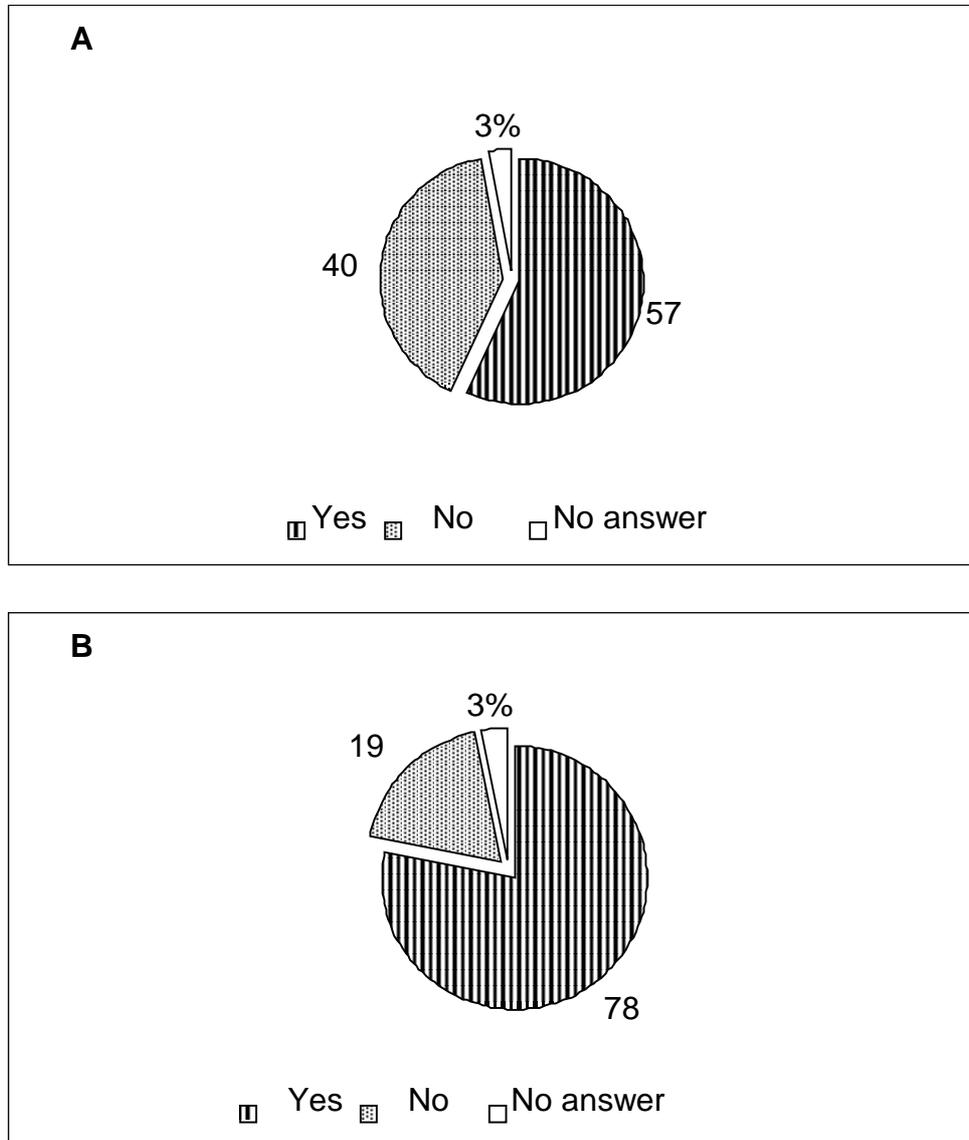


Figure 4. Share of farmers: A – Carrying out own forecasting of pathogens and pest appearance; B – Applying economic thresholds in pesticide treatment decisions

Plant protection

Recommended principles on IFP included following activities: regular inspection and monitoring; using economic threshold levels; application of selective pesticides to save natural enemies and introduction of the predatory mite – *Typhlodromus pyri* to control spider mites. Up to 75% of all sampled farmers (100% of IFP vs. 50% of non-IFP farmers) had carried out regular visual inspections in their orchards for pest occurrence. On the average, 57% of farmers were using some kind of equipment to monitor pest presence and 78% took their plant protection decision based on economic thresholds (Fig. 4). Their own knowledge and experience was used by 93% and 89% farmers respectively as the base for decision taking on pesticide application. Recommendations issued by extension service on the application date of chemical pest control of a given pest species was used by 60% of farmers. The involvement of government extension service in the farmer's plant protection decisions was acknowledged by 62% of orchard owners and 23% used private advisors.

Farmers' attitude to environmental issue may be evaluated on the base of their priorities in purchasing specific pesticide, such as: costs, effectiveness and environmental safety. Environmental effects of pesticides were identified as the first priority by 34% of farmers. The effectiveness in controlling pests was indicated by 81% of farmers and surprisingly only 1/3 of farmers indicated the cost of a pesticide as their first priority.

In spite of farmers' opinion on their general good knowledge on pest control, 45% of farmers acknowledged losses due to diseases, with 26% related to apple scab; 54% noticed damaged by such arthropod pests as aphids, apple moth, tortrids. The majority of interviewed farmers indicated problems with recognition of a pest species. Only 32% of IFP producers acknowledge the lack of losses due to pest and disease infestation.

The IFP producers were requested to provide additional information on the effect of their training on the efficacy of their plant protection programme. Reduction of yield losses due to diseases was recognized by 21% of the IFP producers, with 70% not observing changes in the level of losses. Reduction of losses to mite and insect infestation was recorded by 26% of farmers and 53% did not notice any changes. Surprisingly, 21% of IFP trained producers observed an increase of damages caused by mite and insect pests in their orchards, indicating their improved perception of various damage symptoms which were probably ignored before training.

Farmers' knowledge of IFP principles

Representatives of both groups of farmers: practising and non-practising IFP, were interviewed for their knowledge on the IFP recommendations. The first question was related to the knowledge on using selective pesticides in the IFP orchards. The answers were classified into three categories: fully satisfying; partly satisfying and incorrect answers. Up to 80% of the IFP participants responses were partly satisfying and 10% fully satisfying. Fewer positive answers were giving for listing names of specific selective pesticides. More than 53% responded by not giving any examples, with four times more from non participating in the IFP. Only 20% of interviewed farmers provided correct names of selective pesticides, with 3-times more examples from the IFP group, equal to 38% of the total trained IFP graduates. Up to 61% farmers declared using selective pesticides saving natural enemies in their orchards. However, 39% of the farmers who acknowledged using selective pesticide, listed names of unselective pesticides.

Only 50% of farmers implemented IFP recommendations on controlling rodents by providing shelters for their natural enemy – predatory weasel. No recognized problem with rodent's damage was acknowledged by 46% of orchard owners.

Growing disease resistant apple cultivars

One of the basic principle of integrated crop and pest management is planting pest and diseases resistant cultivars. Only 24% of farmers confirmed growing apple scab resistant cultivars in their orchards, with 'Topaz' as the most popular (by 11.4% of farmers); 'Rubinola', 'Novamac', 'Freedom' and 'Priam' – each by 6.8% of 88 farmers and 'Rajka', 'Rozana' and 'Sawa' – each by 5.7% farmers. Less common were: 'Lodel' (2.0%) and 'Ariwa' (1.1% of farmers). Sixty one percent of these farmers acknowledged economic savings due to lower used of fungicides. Farmers who planted scab resistant apple cultivars (66%) gave reasons why these cultivars were unpopular with consumers. Some farmers believed that scab resistance in apple cultivars is connected with their higher susceptibility to powder mildew disease.

The importance of agronomic practices in reducing pest and diseases infection was confirmed by the majority of interviewed farmers. Approx. 47% of farmers applied urea spraying to control apple scab in fall.

Evaluation of training

Participation in group training and producers' professional gatherings was popular between all farmers interviewed. Fifty three of interviewed orchard owners participated in the IFP courses; other 17% in proper handling of toxic pesticides

and 15% in other training courses. The majority of courses and meetings were organized in their districts; 34% were connected with visits to other copuntry regions, including participation in the national annual conferences on fruit production organized by Research Institute of Pomology and Floriculture in Skierniewice.

Unfortunately, nearly 50% of farmers acknowledged that the courses did not change their present production practices. Other 22.7% introduced new pesticides; 10.2% – selective pesticides; 12.5% – has improved techniques of pesticide application; 3.4% – modified their formation and pruning of trees; 14.8% – introduced other unspecified changes.

Maintaining proper balance between theoretical lectures and practical demonstration is presently a rule in proper farmers' training. Only 8% of farmers complained that courses were limited only to theoretical presentations and 12.5% only to practical demonstration. A proper balance was noted by 54% of course participants, with others giving various grades on proportion between theory and practice. They however noticed that 77% of training courses included practical demonstrations. The efficacy of training may depend on the size of a farmers' group. Up to 79% participated in training in large groups and only 27% in small groups.

The course participants were requested to evaluate the quality of different subjects presented during training sessions. Eighty percent of farmers graded subjects included in the traininig programme as "good"; 20% were unsatisfied. Presentations related to plant protection subjects were evaluated as "good" by 59% farmers; satisfactory by 22% and as insufficient by 19%. Comparing the farmers's evaluation of the course content, still subjects related to plant protection were noted as unsatisfactory by the larger portion of farmes (12.5%) in comparison to marketing (10.2% unsatisfied) and fertilizer management (8%).

Nearly a half of farmers (41%) recognized the needs to introduce some modifications in training programmes as follows:

- a) more practical training by 39% of farmers;
- b) more information on fruit quality requirements and marketing – 20%;
- c) courses in smaller groups – 17%;
- d) more information on plant protection – 10%;
- e) demonstration in orchards under average management, not in the best ones (2%);
- f) demonstration in several orchards, not in one (2%).

The respondents were also requested to evaluate the professional quality of trainers. Thirty one percent of farmers evaluated the invited trainers as very good; 64% as a good; 3% validated them as poor and 2% as unsatisfactory. Fourty three percent of trainees acknowledged a high professional knowledge and experience of

invited speakers and 17% of their effective transfer of knowledge to farmers. Among the negative sides of course programmes, the farmers noticed: using complicated language, promotion of commercial companies, too narrow specialization of some experts, unclear presentations of the course subjects.

Sixty eight percent of orchard owners would prefer other ways to upgrade their professional skills: 42% opted for practical workshops in smaller groups; 15% are content with training but in smaller groups; 15% training by visits to other orchards; 13% only practical exercises; 13% contacts with private advisors and 2% training level should be based on prior evaluation of needs and actual knowledge of trainees in a given region.

General positive approach to training courses was confirmed by 90% of farmers declaring the wish to continue their participation in courses and meetings organized by national extension service.

Evaluation of IFP recommendations by farmers

Majority of farmers positively evaluated the recommendations: with 32% as very good and 66% as good ones. They have nevertheless expressed a number of suggestions for improvement as follows:

- a) more information is needed on complex relations between organisms in the environment;
- b) running regular courses renewing their knowledge on IFP;
- c) more precise recommendations on pest monitoring and control;
- d) registration of more selective pesticides for IFP orchards;
- e) easier procedures for pesticide and heavy metal analysis and releasing IFP certificates;
- f) adaptation of the Polish IFP regulations to the UE requirements.

The majority of the members of the IFP groups confirmed their desire to continue with IFP in their orchards with following arguments: lower production costs; easier marketing of fruits and meeting export standards (Fig. 5). A small number of farmers who resigned from IFP has mentioned following reasons:

- a) excessively time consuming monitoring of pests;
- b) higher production costs than conventional production;
- c) excessively labourious filling of all demanded documents.

CONCLUSIONS

The original objective to initiate the above presented project in 2002 was to document the farmer's attitudes, experience and practices related to IFP ten years after its implementation into Polish orchards and to make some suggestions for

improvements. In the meantime the Polish parliament (Dec. 2003) and the Ministry of Agriculture and Rural Development (June 2004) regulated by means of law and decrees on implementation of integrated crop and pest management based on clear specification of requirements related to certified production of agriculture/horticulture products. The directives supported by a special grant from PHAPA provided a framework for mass training of farmers by qualified trainers in integrated production, primarily fruit and vegetable growers.

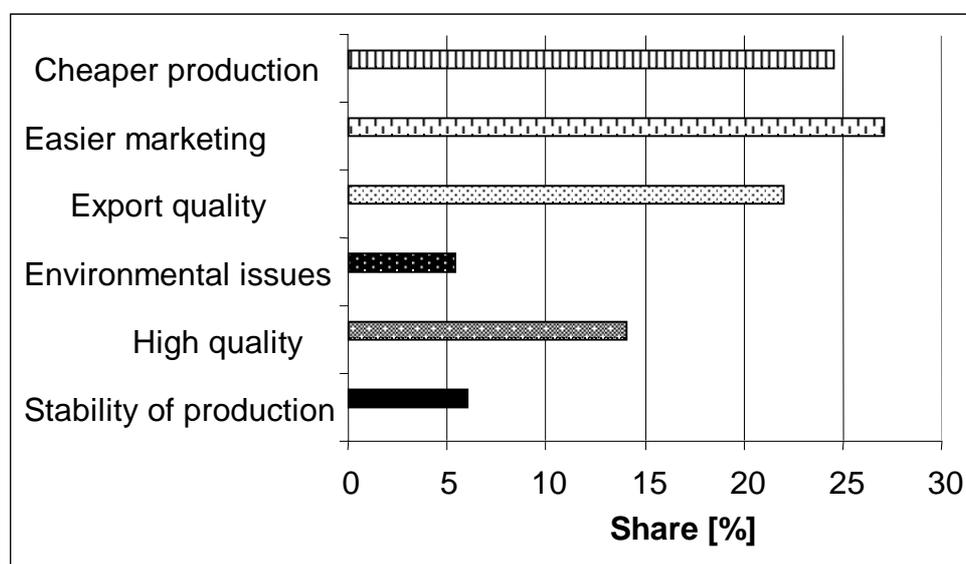


Figure 5. Farmers' reasons given for adoption of Integrated Fruit Production – apples in their orchards

We believe that the above presented methodology and questionnaire results may be used in the future as a baseline to evaluate the implementation of the government programme on human resource development for integrated production in various regions in Poland. At the same time the farmers' attitude to training programmes and trainers of the IFP (apples), as the only practically implemented in Poland, should be used as reference for all other programmes presently initiated in the country.

A lesson was learned that the first programme on integrated production in Poland lacked strong support from the governmental institutions, especially in marketing and advertisement in media on higher quality of IFP products and positive effect on human health and environment. Such assistance has been provided in the last fifteen years in a number of UE countries (Niemczyk 2002). The most recent government decisions and positive responses from wholesale

organizations and supermarkets on IFP products shall provide basis for expansion of the IP systems in Poland.

Our studies also confirmed conclusions made in other countries on the implementation of integrated crop and pest management (ICPM):

1. implementation of ICPM is more difficult than using traditional methods based exclusively on chemical pest control;
2. training of farmers is equally important as the development of ICPM recommendation by researchers;
3. replacement of present model of mass training of farmers in classrooms into smaller groups using active participation of farmers and informal education;
4. there must be a stronger role and influence of farmers production groups and co-operatives practising ICPM on marketing and governmental regulations (Dabrowski 1999, Niemczyk 2001).

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STAN WIEDZY, NASTAWIENIE I STOSOWANE PRAKTYKI W ZAKRESIE INTEGROWANEJ PRODUKCJI JABŁEK W POLSCE CENTRALNEJ

Streszczenie: Program integrowanej produkcji jabłek (IPO) w Polsce został zainicjowany opracowaniem odpowiednich zaleceń przez pracowników Instytutu Sadownictwa i Kwiaciarnictwa (ISK) w 1991 r. Po początkowych sukcesach w jego wdrażaniu wśród sadowników, program ten napotkał na pewne ograniczenia. Tylko 14-16% jabłek konsumpcyjnych pochodziło z sadów prowadzonych wg zasad IPO w latach 2000 – 2004. Początkowym celem naszych akademickich zainteresowań tym projektem było określenie ograniczeń w masowej akceptacji IPO, jedyne w tamtym czasie masowo propagowanego programu integrowanej produkcji w Polsce. Uznano ten program jako model dla dalszych systemów produkcji integrowanej innych upraw ogrodniczych i rolniczych. W badaniach uwzględniono: akceptację proekologicznych technicznych zaleceń IPO przy ich wdrażaniu przez sadowników; ocenę jakości szkoleń; dostęp do służb doradztwa ogrodniczego; opinie i oczekiwania sadowników w stosunku do grup producentów i aspekty ekonomiczne IPO. W badaniach wykorzystano klasyczne ankiety zawierające pytania dotyczące: wiedzy, nastawienia i stosowanych praktyk produkcyjnych i ochrony roślin losowo wybranych sadowników. Bo badań prowadzonych w latach 2002 i 2003 wytypowano dwa rejony leżące w Polsce centralnej: Grójca i Warki. Sadownicy okolic Grójca są oceniani jako liderzy specjalizujący się w nowoczesnych technologiach produkcji sadowniczej w Polsce. Sady w okolicach Warki do niedawna były określane jako tradycyjne, w ostatnich latach przechodzą zarówno zmiany w doborze odmian jak i wdrażania nowych systemów produkcji. Przeprowadzone badania pozwoliły na określenie szeregu braków w wiedzy producentów i szkoleniu sadowników w zakresie IPO jak i sugestie ich poprawienia. Jako główne przyczyny ograniczenia masowego wdrażania IPO w Polsce określono brak zaangażowania i koordynacji różnych instytucji i grup społecznych (z ang. okreśanych jako „*stakeholders*”) na trzech poziomach: ogólnym (instytucji centralnych); produkcji owoców (sadowników) i oddolnym na poziomie konsumentów.

W czasie opracowywania wyników Polska została członkiem Unii Europejskiej i uzyskane wyniki nabrały dodatkowego znaczenia. Powinny być one wykorzystane jako dane bazowe przy przyszłych ocenach efektywności wdrażania programów integrowanej produkcji upraw rolniczych i ogrodniczych zainicjowanych ostatnio przez instytucje rządowe. Wydaje się, że ustawa Parlamentu RP (grudzień 2003) i Rozporządzenie Ministra Rolnictwa i Rozwoju Wsi (czerwiec 2004) dotyczące integrowanej produkcji jak i wzrastające zainteresowanie rynków hurtowych i supermarketów w obrocie produktami posiadającymi odpowiednie certyfikaty jakości powinny stymulować coraz powszechniejszą akceptację IPO przez producentów.

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