Central Statistical Office of Poland

State Plant Health and Seed Inspection Service

Plant Protection Institute, Sośnicowice Branch

PILOT PROJECT:

Transition Facility Multi-Beneficiary

Statistical Co-operation Programme 2005

Lot 2: Pesticide indicators

USAGE OF PLANT PROTECTION PRODUCTS IN WINTER WHEAT

RESULTS

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POLAND 2006r.

Total agricultural land	15 957 tys. ha
Arable land	12 449 tys. ha
Total sown area	11 465 tys. ha
Total cereal sown area	8 381 tys. ha
Winter wheat sown area	1 796 tys. ha
Total number of farms	2 598 624
Number of farms growing crops	2 120 538
Number of farms growing cereals	1 700 487
Number of farms growing winter wheat	710 176

source : GUS 2006

POPULATION FOR SURVEY STUDIES

The surveyed population includes farms from the following provinces

1) **lubelskie**
2) **lodzkie**
3) **zachodniopomorskie**

which have arable land areas over 1 ha and grow winter wheat

study based on wheat harvested in 2006

THREE REGIONS SURVEYED

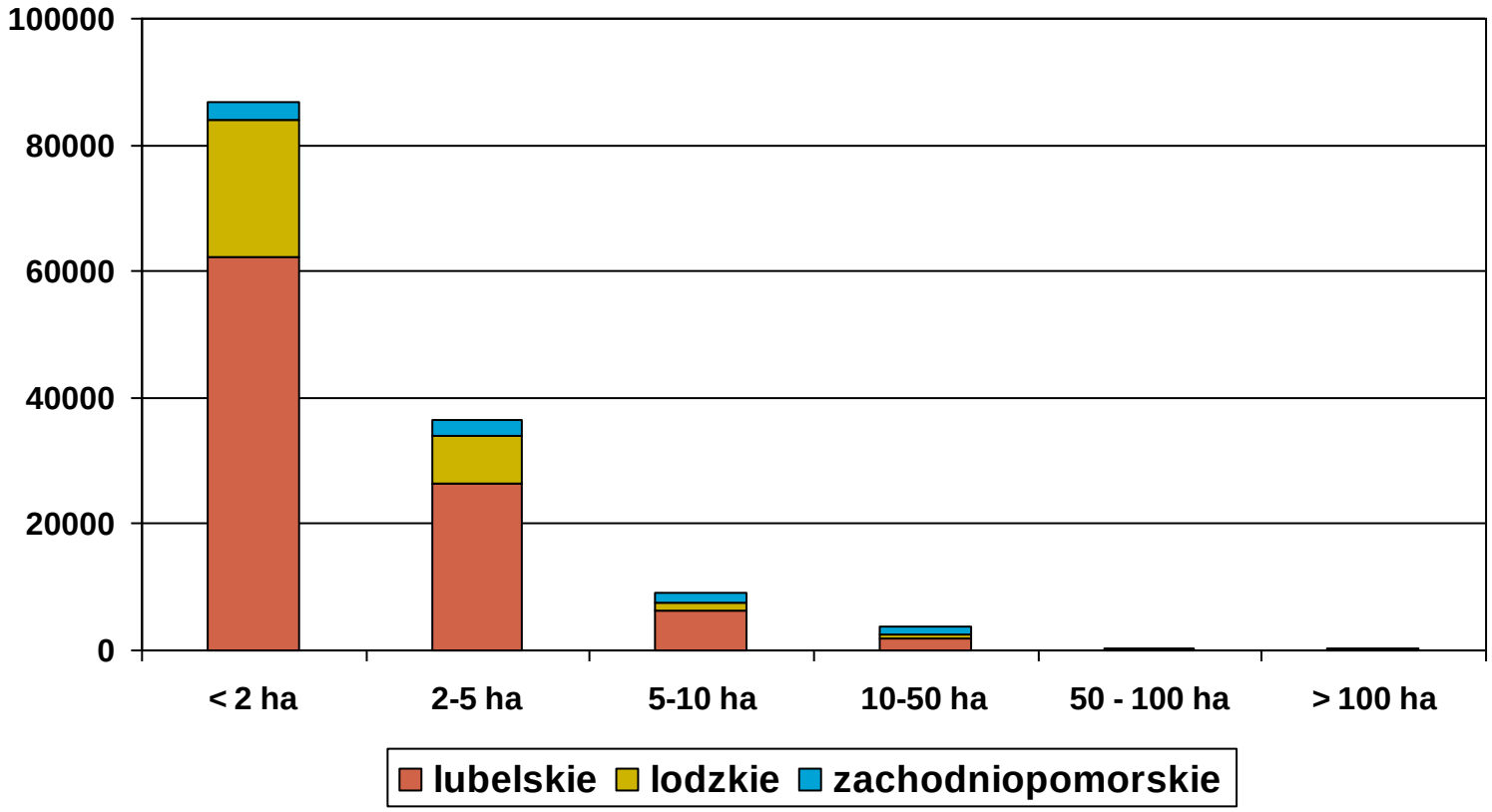
For the purpose of the studies, three regions were selected, whose plant protection practices vary due to:

- **Different geographic, climatic, soil conditions – different levels of infestation with diseases, pests and weeds.**
- **Different farm structure.**

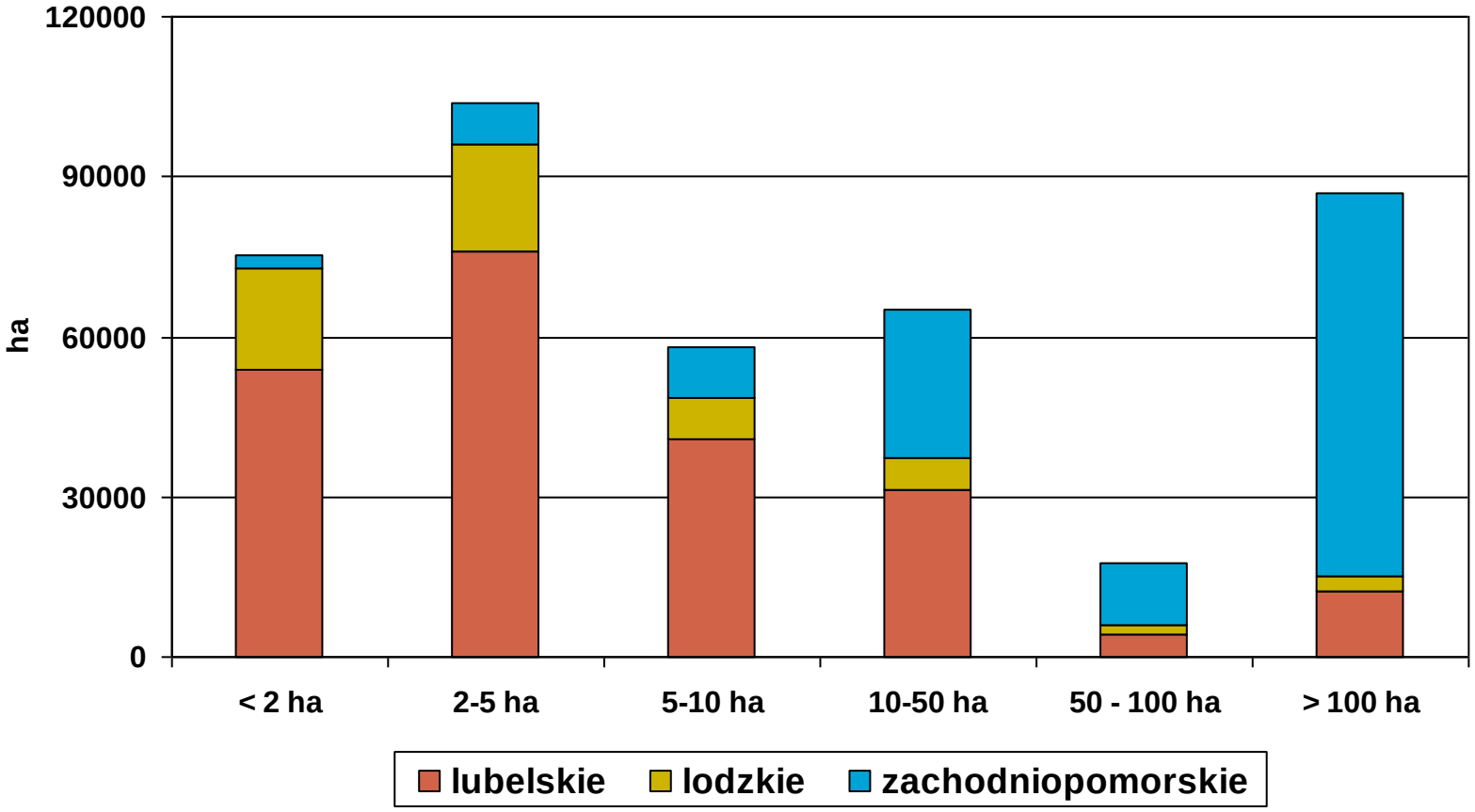
FARMS GROWING WINTER WHEAT IN SELECTED PROVINCES (2006)

PROVINCE	LUBELSKIE	LODZKIE	ZACHODNIO--POMORSKIE
Number of farms	97 132	30 761	8 609
Winter wheat crop area (ha)	218 442	57 597	130 666

WINTER WHEAT CROP – NUMBER OF FARMS



WINTER WHEAT CROP – CROP AREA



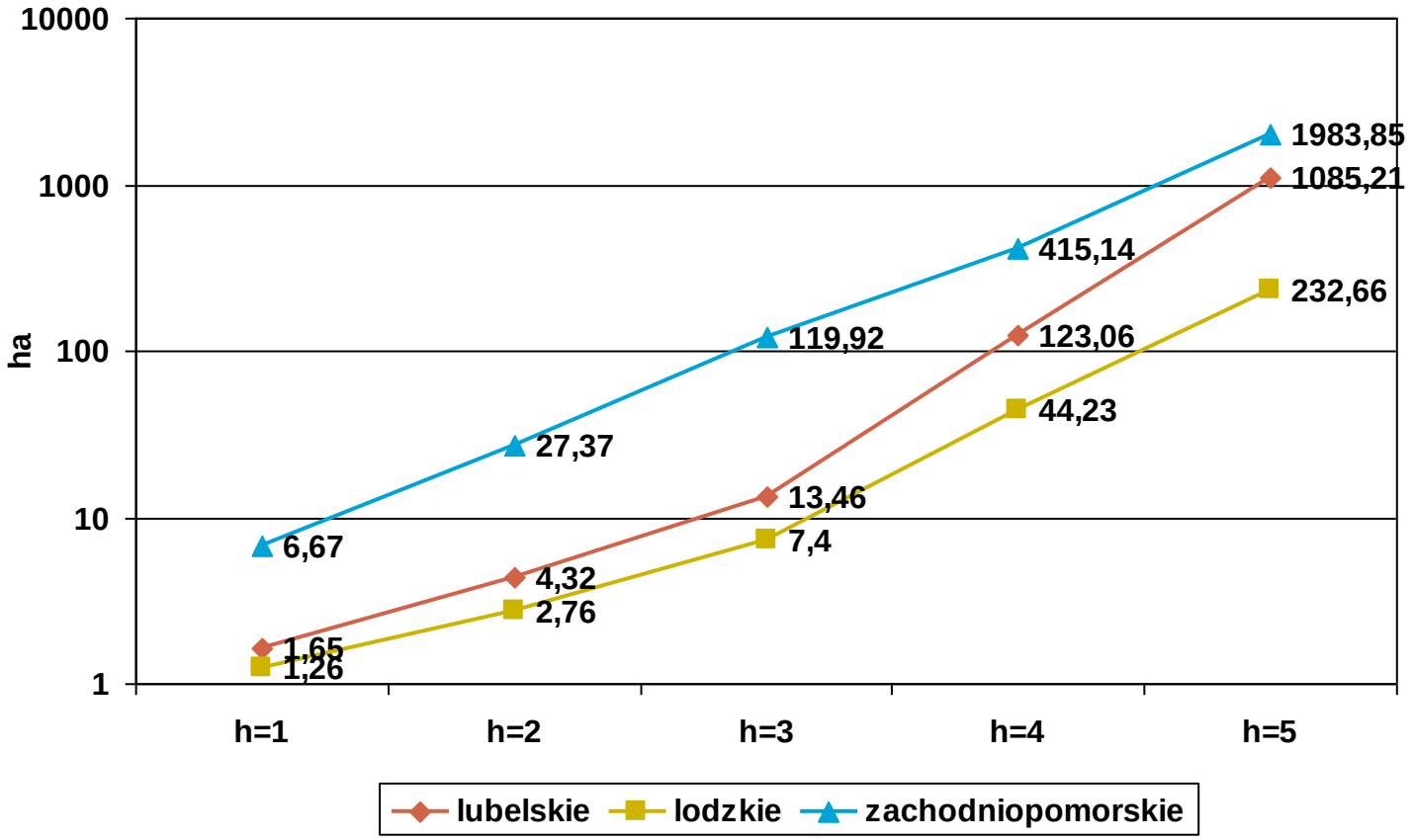
SAMPLING FRAME

- **Statistical Register of Agricultural and Forest Farms was used.**
- **The Register is based on individual data from 2002 General Agricultural Census.**
- **The Register is being updated with data from representative agricultural studies and statistical database.**

SAMPLE SELECTION SCHEME

- **Optimal strata selection scheme was applied.**
- **Each province was divided into 5 strata.**
- **The division of the population into strata and the sample allocation among the strata was performed while applying the numeric optimization method.**
- **Optimization criterion – minimization of the coefficient of variance for total sown area.**

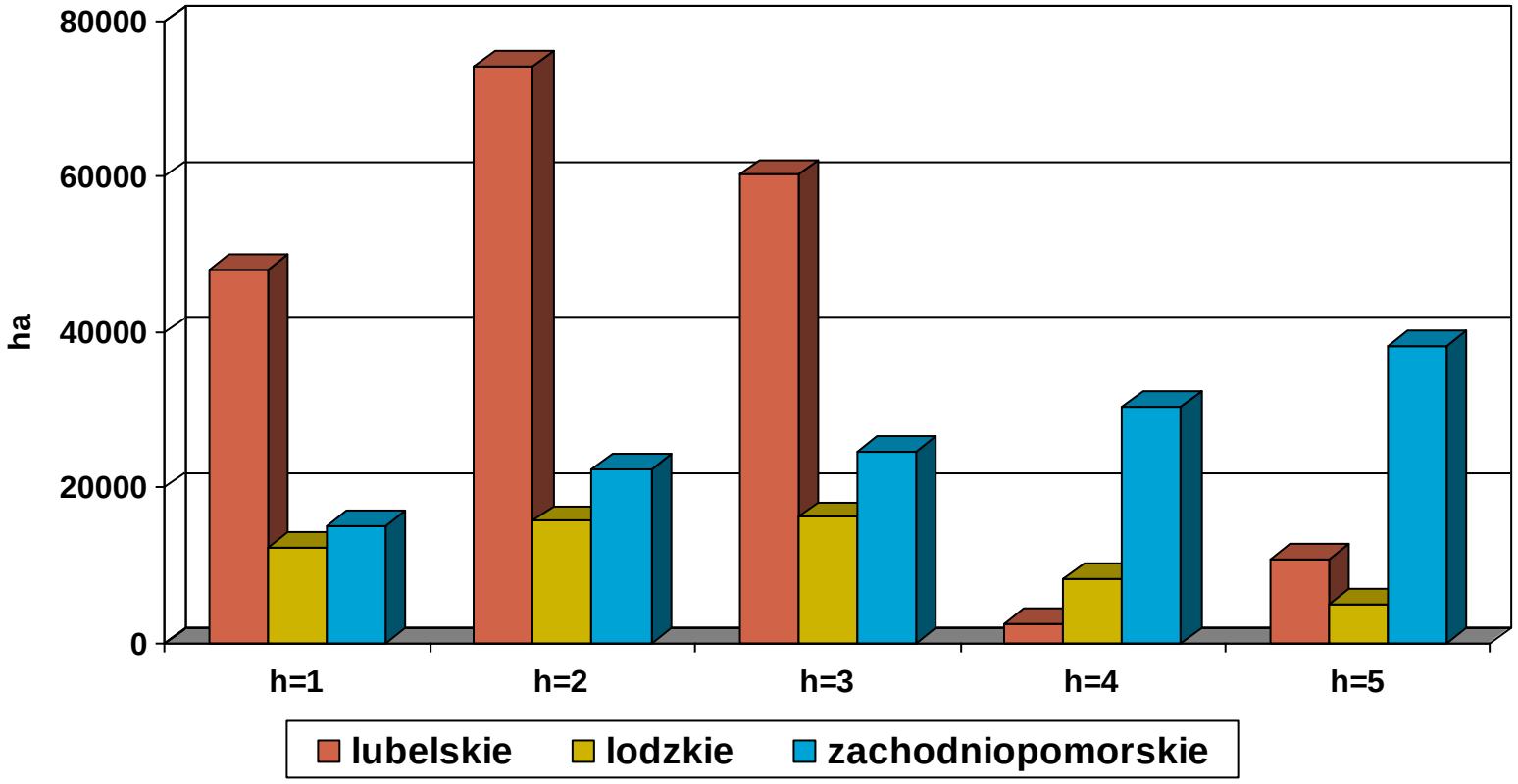
STRATA LIMITS



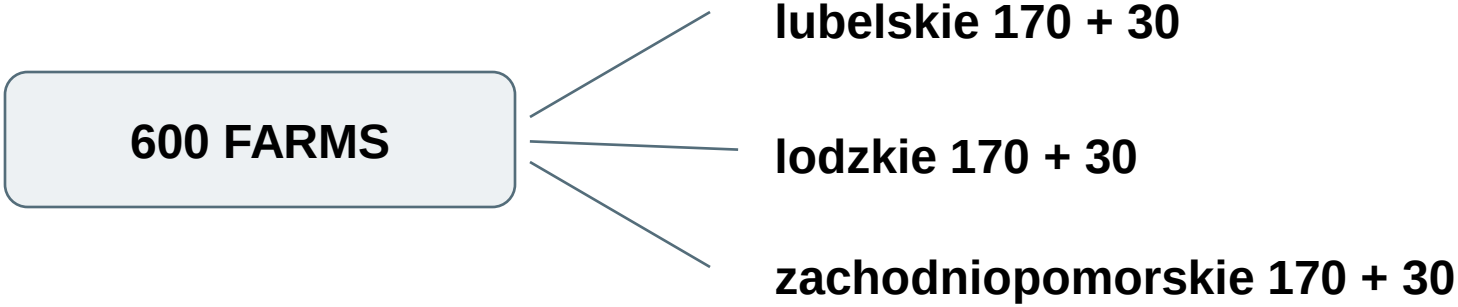
NUMBER OF FARMS WITHIN THE POPULATION AND WITHIN SAMPLE ACCORDING TO STRATA

Province		strata					
		h=1	h=2	h=3	h=4	h=5	total
Lubelskie	N_h	58788	28243	9036	1022	43	97132
	n_h	38	32	30	27	43	170
Lodzkie	N_h	17553	8483	4041	634	50	30761
	n_h	37	22	31	30	50	170
Zachodnio--pomorskie	N_h	6185	1758	481	130	55	8609
	n_h	29	25	30	31	55	170

SOWN AREA PER STRATA



STATISTICAL SAMPLE OF FARMS



- 170 – primary sample unit in each province
- 30 – reserve in each province

- method of collecting information: direct visits at farms

DIRECT VISITS

The National Plant Protection and Seed Inspection Service has qualified inspectors and part of their job is to collect data on the use of pesticides. They poses the necessary knowledge of the subject matter and the experience of working with farmers.

41 interviewers were assigned to collect data for the project .

DEVELOPMENT OF THE NEW DATA COLLECTION SYSTEM

Internet-based system www.pesticide-indicator.pl

- **printing filled-out surveys with data from the selected farms,**
- **entering of data by the interviewer,**
- **remote electronic entering of information from the surveys to the database (internet),**

Technologies used: **APACHE, PHP, MYSQL, SYMFONY WEB FRAMEWORK, AJAX, YAHOO UI**

SYSTEM USER MANUAL

www.pesticide-indicator.pl

1) **Introduction**
2) **Logging in**
3) **Survey Form**
   - **working through the system**
   - **list of surveys**
   - **new survey**
   - **explanation of survey form fields**
   - **filling out the survey**
   - **adding more treatments**
   - **pesticide – pull-down menu from the official register**

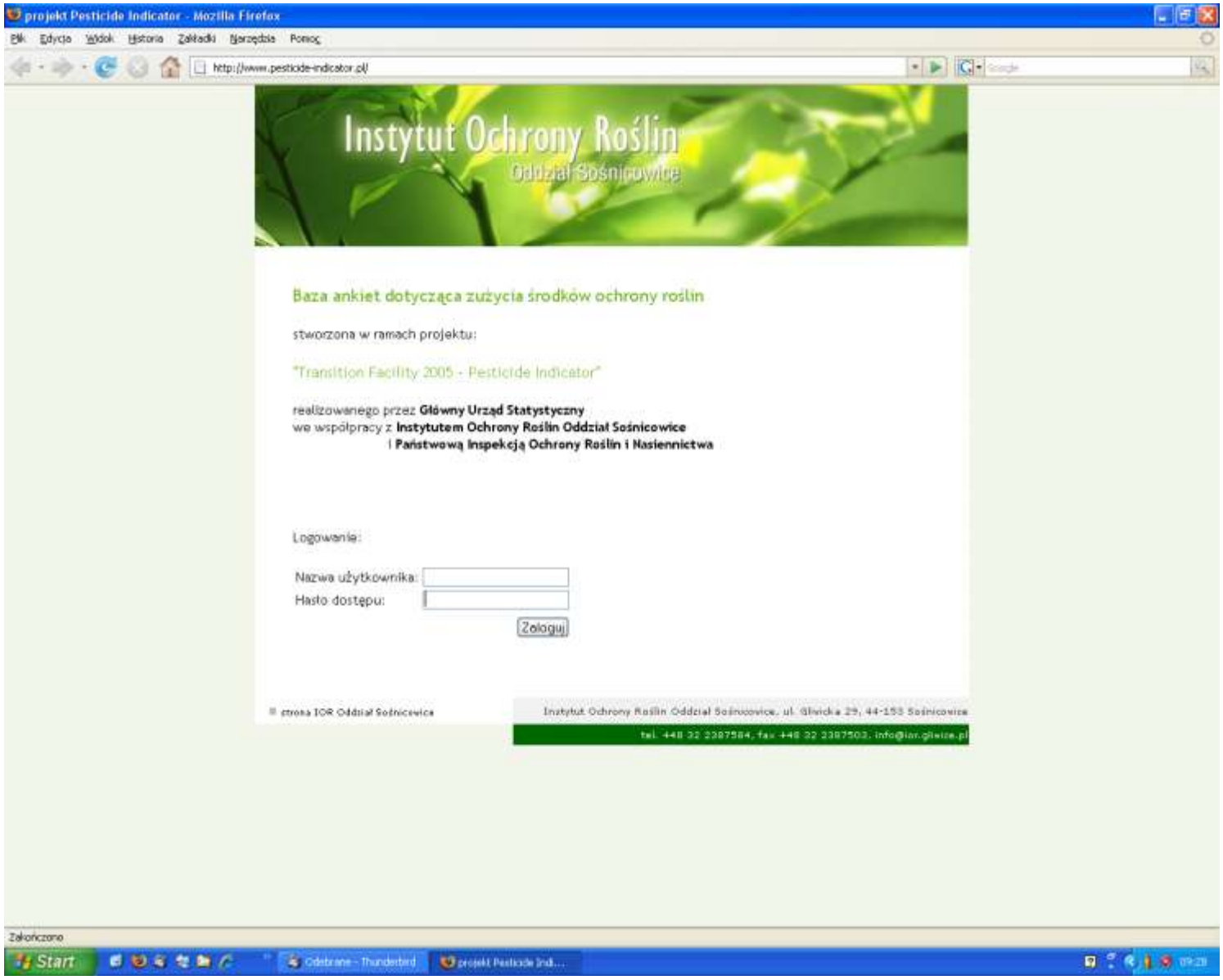
SYSTEM USER MANUAL cont'd

www.pesticide-indicator.pl

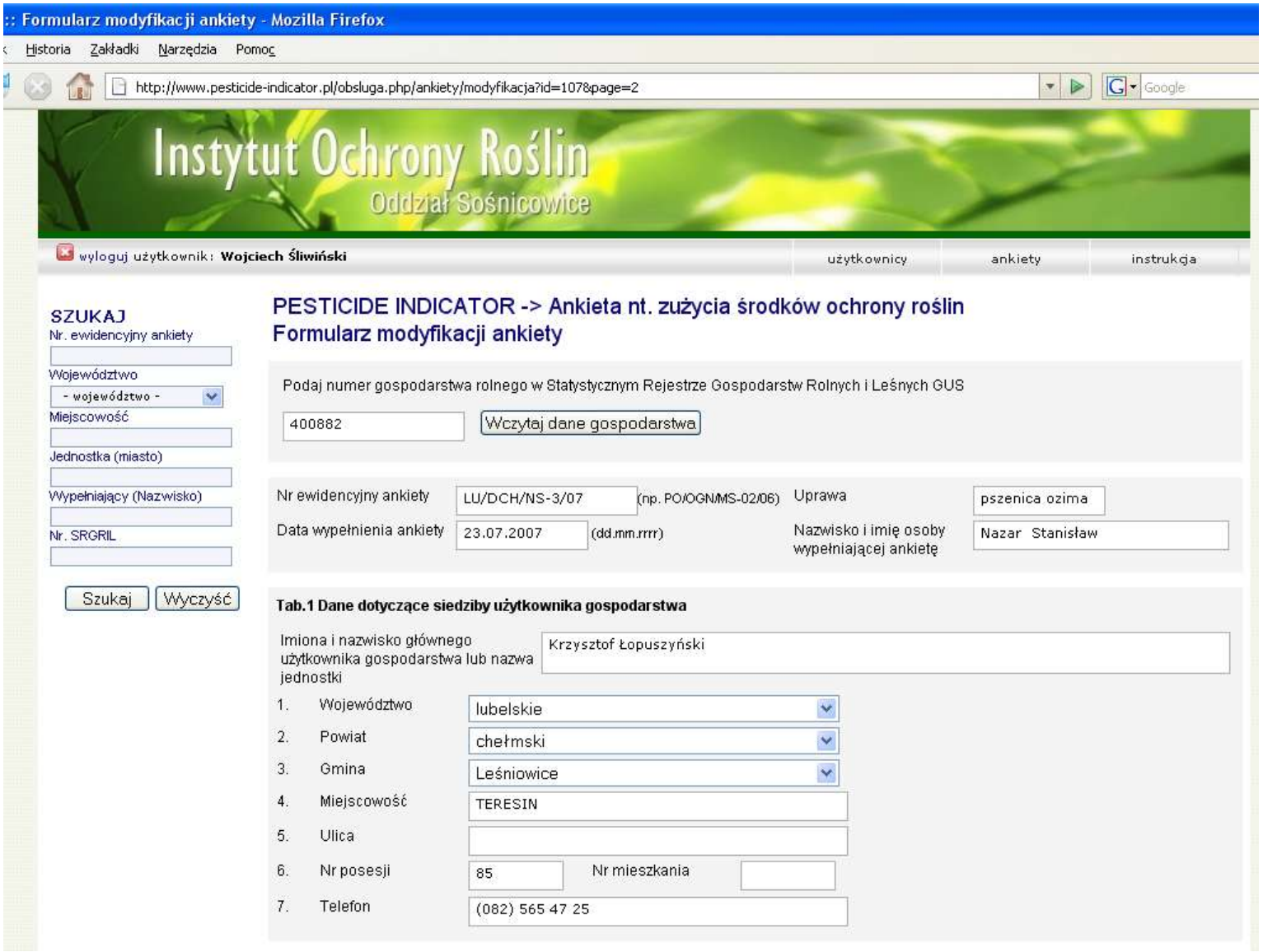
- dose
- unit of measurement
- area (ha)
- period
- entering changes on the survey
- printing the survey
- looking up surveys

4) Users, coordinator, manager (different levels of accessing the database)
5) The end – Logging out

START PAGE OF THE SYSTEM



SURVEY FORM


:: Formularz modyfikacji ankiety - Mozilla Firefox
Historia Zakładki Narzędzia Pomoc
http://www.pesticide-indicator.pl/obsluga.php/ankiety/modyfikacja?id=107&page=2
Instytut Ochrony Roślin
Oddział Sośnicowice
wyloguj użytkownik: Wojciech Śliwiński
użytkownicy
ankiety
instrukcja
SZUKAJ
Nr. ewidencyjny ankiety
Województwo
- województwo -
Miejscowość
Jednostka (miasto)
Wypełniający (Nazwisko)
Nr. SRGRL
Szukaj
Wyczyść
PESTICIDE INDICATOR -> Ankieta nt. zużycia środków ochrony roślin
Formularz modyfikacji ankiety
Podaj numer gospodarstwa rolnego w Statystycznym Rejestrze Gospodarstw Rolnych i Leśnych GUS
400882
Wczytaj dane gospodarstwa
Nr ewidencyjny ankiety
LU/DCH/NS-3/07
(np. PO/OGN/MS-02/06)
Uprawa
pszenica ozima
Data wypełnienia ankiety
23.07.2007
(dd.mm.rrrr)
Nazwisko i imię osoby wypełniającej ankietę
Nazar Stanisław
Tab.1 Dane dotyczące siedziby użytkownika gospodarstwa
Imiona i nazwisko głównego użytkownika gospodarstwa lub nazwa jednostki
Krzysztof Łopuszyński
1. Województwo
lubelskie
2. Powiat
chełmski
3. Gmina
Leśniowice
4. Miejscowość
TERESIN
5. Ulica
6. Nr posesji
85
Nr mieszkania
7. Telefon
(082) 565 47 25

SURVEY FORM cont'd

Tab.2 Charakterystyka gospodarstwa i badanej uprawy

Forma własności gospodarstwa	◉ Indywidualne gospodarstwo rolne	○ Gospodarstwo rolne osób prawnych		
Grupa obszarowa gospodarstwa	○ 1,0-5,0 ha	○ 5,1-15,0 ha	◉ 15,1-50,0 ha	○ < 50 ha
Rodzaj gospodarstwa	◉ konwencjonalne	○ integrowane	○ ekologiczne	
Powierzchnia uprawy w gospodarstwie (ha)	15,4			
Powierzchnia chroniona uprawy (ha)	15,4			

Tab. 3 Informacje na temat zużycia środków ochrony roślin w badanej uprawie

Źródło danych: ○ Ewidencja zabiegów ◉ Informacja ustna

Środek ochrony roślin	Dawka	Jedn.	Pow.	Termin	Przyczyna zastosowania	[Dodaj]
Vincit 050 FS	0,66	L	15,4	04.10.2005	zaprawianie nasion	[EDT] [DEL]
Attribut 70 WG	0,06	Kg	15,4	02.05.2006	chwasty jednoliścienne	[EDT] [DEL]
Mustang 306 SE	0,4	L	15,4	02.05.2006	chwasty dwuliścienne	[EDT] [DEL]
Sarfun 500 SC	0,4	L	15,4	19.05.2006	choroby grzybowe	[EDT] [DEL]

Zapisz | Anuluj | Usuń

SURVEY FORM cont'd

CHOICE OF PLANT PROTECTION PRODUCTS IN FEELING TREATMENTS

Tab. 3 Informacje na temat zużycia środków ochrony roślin w badanej uprawie

Źródło danych: ○ Ewidencja zabiegów ◉ Informacja ustna

Środek ochrony roślin	Dawka	Jedn.	Pow.		Termin	Przyczyna zastosowania	[Dodaj]
V	0,66	L	15,4	ha	04.10.2005	zaprawianie nasion	[OK] [CANCEL]
					02.05.2006	chwasty jednoliścienne	[EDT] [DEL]
					02.05.2006	chwasty dwuliścienne	[EDT] [DEL]
					19.05.2006	choroby grzybowe	[EDT] [DEL]

- Valbon 72 WG
- Vectra 100 SC
- Velvet 75 SL
- Ventop 350 SC
- Venzar 80 WP
- Vertimec 018 EC
- Vincit 050 FS
- Vista 228 SE
- Vitavax 200 FS
- Vitavax 200 WS
- Vitavax 2000 FS
- VK-2 Special 80 EC
- Vondozeb 75 WG
- Vydate 240 SL

SURVEY RESULTS PROCESSING SCHEME

1) **Analysis of data entered by the interviewers**
   - **number of surveys entered**
   - **accuracy of data**
   - **conformity of data in the database with the printed surveys**
2) **Preparation of data for aggregation**
3) **Development of a computing system**
4) **Computing and aggregation**
5) **Reporting the results in tabular form**

PREPARATION OF DATA

1) **Importing data into the local database system at the Plant Protection Institute.**
2) **Importing the updated glossaries: pesticides, active substances, Eurostat classification.**
3) **Examining links among data.**
4) **Examining units of measurement for dosage used in each treatment.**
5) **Examining the accuracy of dosage values.**

PERFORMING THE STUDY

Province	Number of selected farms	Number of surveys „good" or „valid"	Number of missed surveys
lubelskie	170 + 30	171	18
lodzkie	170 + 30	171	20
zachodnio--pomorskie	170 + 30	166	24
TOTAL	510 + 90	508	62

100% of surveys planned by GIORiN were performed

SURVEYED FARMS AND WINTER WHEAT CROP AREAS

Province	Farm size group (ha)	Number of farms	Treated area
lubelskie	1.0 – 5.0	31	42.47
	5.1 – 15.0	53	217.22
	15.1 – 50.0	36	586.32
	over 50.1	51	10110.84
lodzkie	1.0 – 5.0	15	15.04
	5.1 – 15.0	56	141.16
	15.1 – 50.0	41	247.96
	over 50.1	59	4744.27
zachodnio--pomorskie	1.0 – 5.0	4	3.04
	5.1 – 15.0	15	47.31
	15.1 – 50.0	23	249.39
	over 50.1	124	41773.29
		508	

NUMBER OF PESTICIDES AND ACTIVE SUBSTANCES PER GROUP

Pesticide Group	Pesticides		Active substances	
	Number	%	Number	%
adjuvants	6	2.6	6	5.2
acaricides	3	1.3	2	1.7
herbicides	88	38.8	48	41.4
fungicides	97	42.7	45	38.8
insecticides	20	8.8	11	9.5
growth regulators	12	5.3	3	2.6
surfactants	1	0.4	1	0.9
TOTAL	227	100	116	100

NUMBER OF TREATMENTS PER PESTICIDE GROUP AND FARM SIZE GROUP

Product Group	Farm size group (ha)	Number of treatments
growth regulators	1.0 – 5.0	0.12
fungicides	1.0 – 5.0	1.07
herbicides	1.0 – 5.0	1.08
growth regulators	5.1 – 15.0	0.22
fungicides	5.1 – 15.0	1.59
herbicides	5.1 – 15.0	1.34
insecticides	5.1 – 15.0	0.05
adjuvants	5.1 – 15.0	0.03

NUMBER OF TREATMENTS PER PESTICIDE GROUP AND FARM SIZE GROUP cont'd

Product Group	Farm size group (ha)	Number of treatments
growth regulators	15.1 – 50.0	0.46
fungicides	15.1 – 50.0	2.34
herbicides	15.1 – 50.0	1.75
insecticides	15.1 – 50.0	0.09
adjuvants	15.1 – 50.0	0.02
acaricides	15.1 – 50.0	0.03

NUMBER OF TREATMENTS PER PESTICIDE GROUP AND FARM SIZE GROUP cont'd

Product Group	Farm size group (ha)	Number of treatments
growth regulators	over 50.1	1.07
fungicides	over 50.1	4.32
herbicides	over 50.1	2.69
insecticides	over 50.1	0.73
adjuvants	over 50.1	0.10
acaricides	over 50.1	0.04
surfactants	over 50.1	0.00

NOTE:

The number of treatments does not include "tank-mix" applications.

The application of three different products in the same treatment is recorded as three treatments.

PESTICIDE USE GENERAL INDICATOR PER FARM SIZE GROUP AND TYPE OF OWNERSHIP

Province	Farm size group (ha)	Type of ownership	Mean use (kg of AS/ha)
lubelskie	1.0 – 5.0	1	0.82
	5.1 – 15.0	1	1.18
	15.1 – 50.0	1	1.48
	over 50.1	1	2.09
	over 50.1	2	1.59

1 – privately-owned farms

2 – company-owned farms

PESTICIDE USE GENERAL INDICATOR PER FARM SIZE GROUP AND TYPE OF OWNERSHIP cont'd

Province	Farm size group (ha)	Type of ownership	Mean use (kg of AS/ha)
lodzkie	1.0 – 5.0	1	0.78
	5.1 – 15.0	1	1.22
	15.1 – 50.0	1	1.47
	15.1 – 50.0	2	3.52
	over 50.1	1	1.84
	over 50.1	2	2.59

1 – privately-owned farms

2 – company-owned farms

PESTICIDE USE GENERAL INDICATOR PER FARM SIZE GROUP AND TYPE OF OWNERSHIP cont'd

Province	Farm size group (ha)	Type of ownership	Mean use (kg of AS/ha)
zachodnio--pomorskie	1.0 – 5.0	1	1.59
	5.1 – 15.0	1	1.75
	15.1 – 50.0	1	1.9
	over 50.1	1	3.18
	over 50.1	2	3.35

1 – privately-owned farms

2 – company-owned farms

MEAN INDICATOR OF PESTICIDE USE

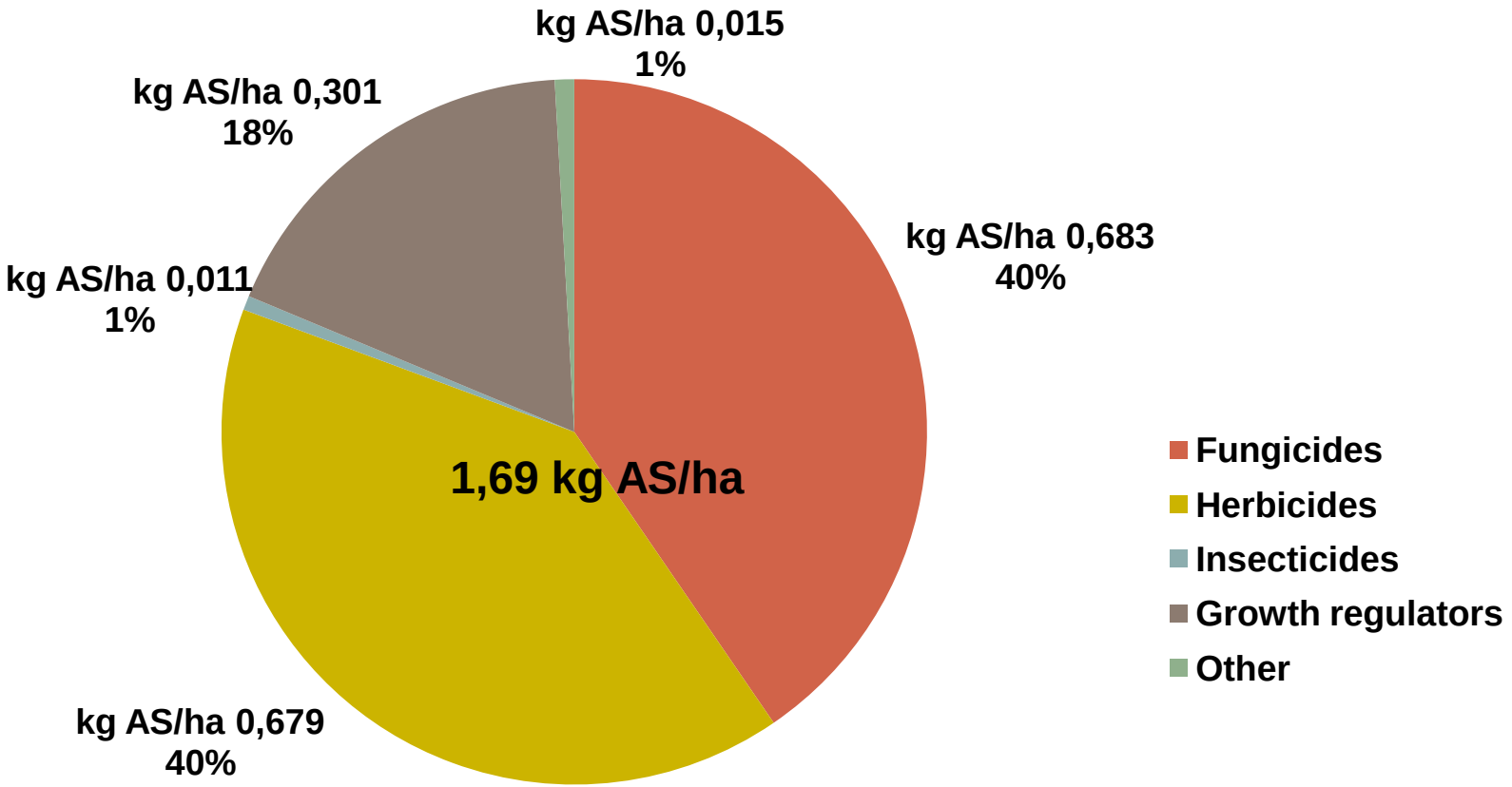
- **lubelskie:** **1.16 kg AS/ha**
- **lodzkie:** **1.33 kg AS /ha**
- **zachodniopomorskie:** **2.82 kg AS/ha**

mean value for the three selected provinces

1.69kg AS/ha

(the mean was calculated based on the total wheat crop area in all three provinces and the above indicators for provinces)

PESTICIDE USE INDICATOR PER PRODUCT GROUP (THREE PROVINCES)



MEAN USE OF ACTIVE SUBSTANCES PER CHEMICAL GROUP ACCORDING TO EUROSTAT CLASSIFICATION

FUNGICIDES

Eurostat Code	Category	Chemical Group	Mean use (kg/ha)	% of share in the mean general indicator
F1.2	Inorganic fungicides	Inorganic sulphur	0.141	8.35
F2.3	Fungicides based on carbamates and dithiocarbamates	Dithiocarbamate fungicides	0.125	7.40
F3.1	Fungicides based on benzimidazoles	Benzimidazole fungicides	0.148	8.76
F4.1	Fungicides based on imidazoles and triazoles	Conazole fungicides	0.075	4.44
F4.2	Fungicides based on imidazoles and triazoles	Imidazole fungicides	0.023	1.36
F5.1	Fungicides based on morpholines	Morpholine fungicides	0.049	2.90

FUNGICIDES – cont'd

Eurostat Code	Category	Chemical Group	Mean use (kg/ha)	% of share in the mean general indicator
F6.1	Other fungicides	Aliphatic nitrogen fungicides	0.001	0.06
F6.2	Other fungicides	Amide fungicides	0.015	0.89
F6.3	Other fungicides	Anilide fungicides	0.013	0.77
F6.5	Other fungicides	Aromatic fungicides	0.022	1.30
F6.6	Other fungicides	Dicarboximide fungicides	0.000	0.00
F6.10	Other fungicides	Oxazole fungicides	0.002	0.12
F6.11	Other fungicides	Phenylpyrrole fungicides	0.001	0.06
F6.13	Other fungicides	Pyrimidine fungicides	0.009	0.53
F6.14	Other fungicides	Quinoline fungicides	0.001	0.06
F6.16	Other fungicides	Strobilurine fungicides	0.021	1.24
F6.18	Other fungicides	Unclassified fungicides	0.037	2.19

HERBICIDES – cont'd

Eurostat Code	Category	Chemical Group	Mean use (kg/ha)	% of share in the mean general indicator
H1.1	Herbicides based on phenoxy-phytohormones	Phenoxy herbicides	0.255	15.10
H7.1	Other herbicides	Aryloxyphenoxypropionic herbicides	0.002	0.12
H2.3	Herbicides based on triazines and triazinones	Triazinone herbicides	0.001	0.06
H3.2	Herbicides based on amides and anilides	Anilide herbicides	0.013	0.77
H3.3	Herbicides based on amides and anilides	Chloroacetanilide herbicides	0.001	0.06
H5.1	Herbicides based on dinitroaniline derivatives	Dinitroaniline herbicides	0.038	2.25
H6.1	Herbicides based on derivatives of urea, of uracil or of sulphonylurea	Sulfonylurea herbicides	0.013	0.77
H6.3	Herbicides based on derivatives of urea, of uracil or of sulphonylurea	Urea herbicides	0.289	17.11

HERBICIDES – cont'd

Eurostat Code	Category	Chemical Group	Mean use (kg/ha)	% of share in the mean general indicator
H7.3	Other herbicides	Benzoic-acid herbicides	0.022	1.30
H7.14	Other herbicides	Organophosphorus herbicides	0.036	2.13
H7.15	Other herbicides	Phenylpyrazole herbicides	0.000	0.00
H7.18	Other herbicides	Pyridinecarboxylic-acid herbicides	0.000	0.00
H7.19	Other herbicides	Pyridyloxyacetic-acid herbicides	0.006	0.36
H7.24	Other herbicides	Triazolinone herbicides	0.000	0.00
H7.25	Other herbicides	Triazolone herbicides	0.003	0.18

INSECTICIDES, GROWTH REGULATORS AND OTHER – cont'd

Eurostat Code	Category	Chemical Group	Mean use (kg/ha)	% of share in the mean general indicator
I1.1	Insecticides based on pyrethroids	Pyrethroid insecticides	0.001	0.06
I3.2	Insecticides based on carbamates and oxime-carbamate	Carbamate insecticides	0.001	0.06
I4.1	Insecticides based on organophosphates	Organophosphorus insecticides	0.009	0.53
PGR1.1	Physiological Plant growth regulators	Physiological plant growth regulators	0.301	17.82
ZR1.1	Mineral oils	Mineral oil	0.005	0.30
ZR2.1	Vegetal oils	Vegetal oil	0.000	0.00
ZR5.2	All other plant protection products	Other plant protection products	0.010	0.59

MOST COMMON ACTIVE SUBSTANCES PER TOTAL AREA TREATED WITHIN THE PESTICIDE GROUP

FUNGICIDES

Name of active substance	% of total area treated	% of total area treated within pesticide group
carbendazim	13.0	23.4
thiram	8.5	15.2
epoxiconazole	4.1	7.4
propiconazole	3.8	6.8
tebuconazole	3.1	5.6

HERBICIDES – cont'd

Name of active substance	% of total area treated	% of total area treated within pesticide group
isoproturon	4.6	12.9
2,4-D	4.1	11.7
iodosulfuron	3.5	10.0
dicamba	3.2	9.0
chlorsulfuron	2.9	8.3

INSECTICIDES – cont'd

Name of active substance	% of total area treated	% of total area treated within pesticide group
alpha-cypermethrin	1.2	49.2
dimethoate	0.6	23.9
cypermethrin	0.2	7.1
pirimicarb	0.1	5.0
lambda-cyhalothrin	0.1	4.4

GROWTH REGULATORS – cont'd

Name of active substance	% of total area treated	% of total area treated within pesticide group
chlormequat chloride	4.6	77.5
trinexapac-ethyl	1.2	20.1
ethephon	0.1	2.4

WORK AHEAD OF US

- **Develop a detailed list of active substances, their volumes and areas of application.**
- **Analyse treatment periods and applied doses.**
- **Examine the purpose for which pesticides were applied.**
- **Perform analysis of pesticide formulation volume.**
- **Compute coefficients, e.g. coefficient of the rate of crop area treated with an AS to the total crop area – for the most commonly used active substances.**

WORK AHEAD OF US – cont'd

- **Error analysis.**
- **Generalize of the results to the entire country.**
- **Develop conclusions and recommendations to be used in the national pesticide usage data collection system.**
- **Estimation of the cost of surveys in the entire country.**