Revised seed orchard strategy in Poland

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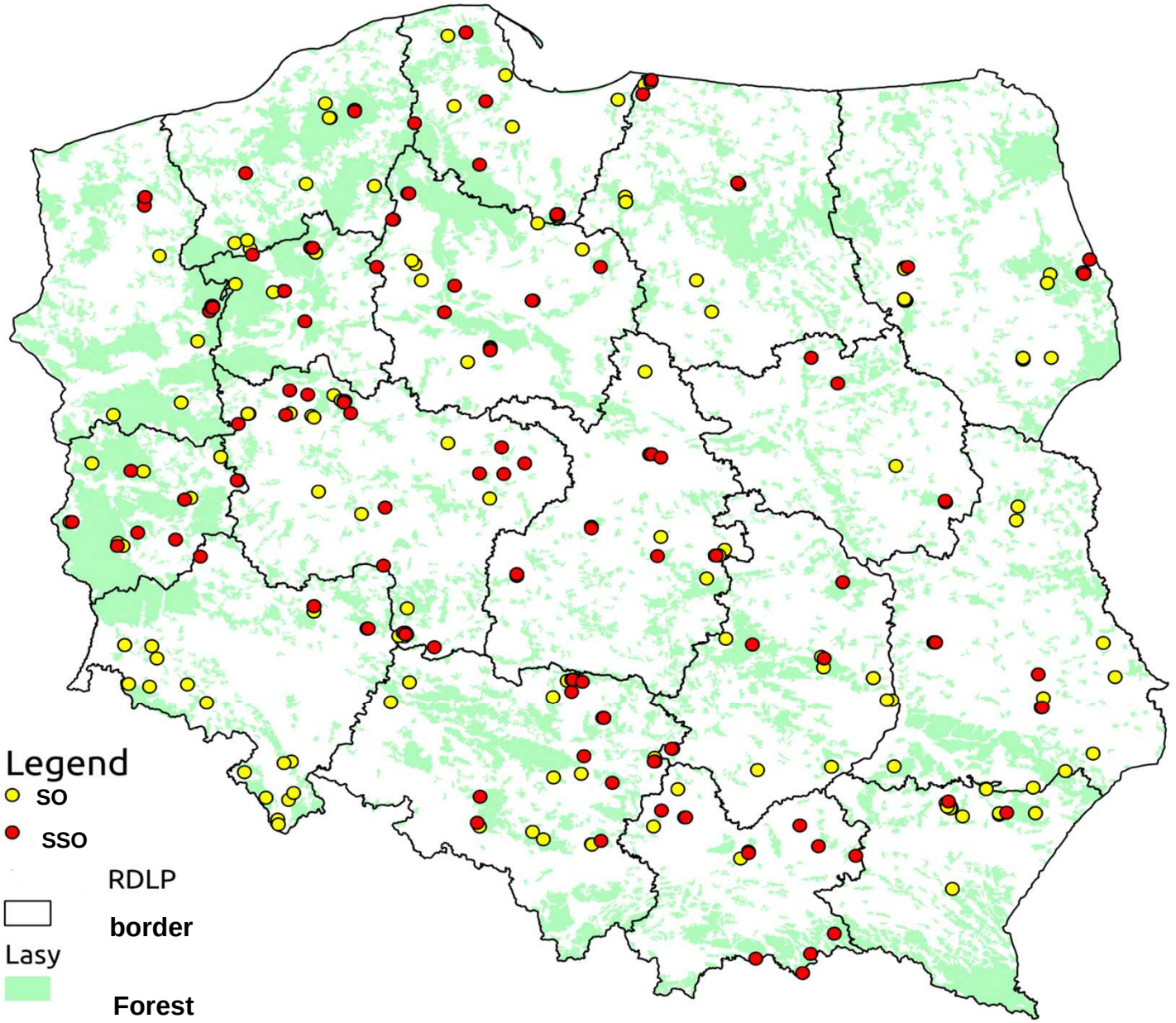
Introduction

- Presently exist in Poland:
  - 124 seedling seed orchards on 735 ha for 14 tree species.
  - 179 seed orchards on 1 235 ha for 22 tree species.
- Material
  - SSO open pollination progenies from trees phenotypically selected in forests.
  - SO grafted clones of plus trees
- SSO are designed in spacing 5 x 5 m, SO - 6 x 6 m
- No crown pruning has been applied (some exceptions)
- The first thinning are planned after 10 – 15 years.


Legend
SO
SSO
RDLP
border
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Forest

Statistics

No	Species	No SO	No SSO	Area SO [ha]	Area SSO [ha]
1	Scots pine (Pinus sylvestris)	44	31	426,8	248,0
2	European larch (Larix decidua)	31	25	244,7	178,5
3	Norway spruce (Picea abies)	10	2	75,6	12,1
4	Silver fir (Abies alba)	3	13	83,6	15,4
5	Douglas fir(Pseudotsuda m.)	7	5	37,6	32,9
6	Black pine (Pinus nigra)	5	23	25,0	110,6
7	Swiss pine (Pinus cembra)	2	1	10,2	10,0
8	Eastern White Pine (Pinus strobus)	1	1	2,8	4,4
9	European Yew (Taxus baccata)	1		0,5	
10	European Beech (Fagus sylvatica)	9	8	53,6	43,8
11	Pedunculate Oak (Quercus robur)	6	4	32,0	23,4
12	Sessile Oak (Quercus petraea)	9	4	53,4	21,5
13	Lime (Tilia cordata)	17		96,6	
14	Silver birch (Betula pendula)	10	2	47,6	13,4
15	Black alder (Alnus glutinosa)	11		62,1	
16	Wild cherry (Prunus avium)	6	4	25,8	16,3
17	Ash (Fraxinus excelsior)	1		10,3	
18	Black Locust (Robinia pseudoacacia)	2		6,6	
19	Wych Elm (Ulmus glabra)	1		4,0	
20	European White Elm (Ulmus laevis)	1		4,4	
21	Sycamore maple (Acer pseudoplatanus)	1	1	3,2	4,6
22	European Rowan (Sorbus aucuparia)	1		1,4	
	Total	179	124	1235,6	734,6

Seed orchard - coniferous

Species	1 bunch 70	2 bunch 80	3 bunch 90	4 bunch Since 2000	No	Area [ha]
Scots pine	13	10	16	5	41	415
European larch	6	7	13	5	31	247
Norway spruce			7	3	10	88
Silver fir			1	2	3	72
Black pine			5		5	18
Swiss pine				2	2	5
Eastern White Pine			1		1	
Douglas fir			3	4	7	39
					103	884

Seed orchard – deciduous trees

Species	1 bunch 70	2 bunch 80	3 bunch 90	4 bunch since 2000	No	Area [ha]
Common oak				6	6	34
Sessile oak				9	9	57
Beech			3	6	9	47
Birch		2	6	2	10	47
Small-leaved lime		3	10	4	17	90
Black alder			6	5	11	61
Bird cherry				5	5	17
Sycamore maple				1	1	3
Ash				1	1	6
Black locust				2	2	6
					71	351

Seed use

Tree species	Total [kg]	Part from SO and SSO [kg]	SO and SSO [%]
Scots pine	442578	33 248	7,5 %
Norway spruce	30983	272	0,9 %
European larch	15423	9 789	63,5 %
Silver birch	1553	18	1,2 %
Small-leaved lime	729	109	15,1 %
Black alder	985	100	10,2 %

Important facts about SO in Poland

- Big area
- Many species with different importance
- Not always connected with breeding program
- In Poland often seedling seed orchards are established as objects combining production of improved seeds with genetic testing
- SO are not fully utilized

Seed orchards in Poland
coniferous species

	the seventies	the eighties	the nineties	since 2000 year	the total number of SO	total area (ha)
Scots pine	**13**	**10**	**16**	**5**	**44**	**415**
European larch	**6**	**7**	**13**	**5**	**31**	**247**
Norway spruce			**7**	**3**	**10**	**88**
Silver fir			**1**	**2**	**3**	**72**
Black pine			**5**		**5**	**18**
Stone pine				**2**	**2**	**5**
Weymouth pine			**1**		**1**	
Douglas fir			**3**	**4**	**7**	**39**
					103	**884**

Seed orchards in Poland
deciduous species

	the eighties	the eighties	since 2000 year	the total number of SO	total area (ha)
Common oak			**6**	**6**	**34**
Sessile oak			**9**	**9**	**57**
Beech		**3**	**6**	**9**	**47**
Birch	**2**	**6**	**2**	**10**	**47**
Small-leaved lime	**3**	**10**	**4**	**17**	**90**
Black alder		**6**	**5**	**11**	**61**
Bird cherry			**5**	**5**	**17**
Sycamore maple			**1**	**1**	**3**
Ash			**1**	**1**	**6**
Black locust			**2**	**2**	**6**
				71	**351**

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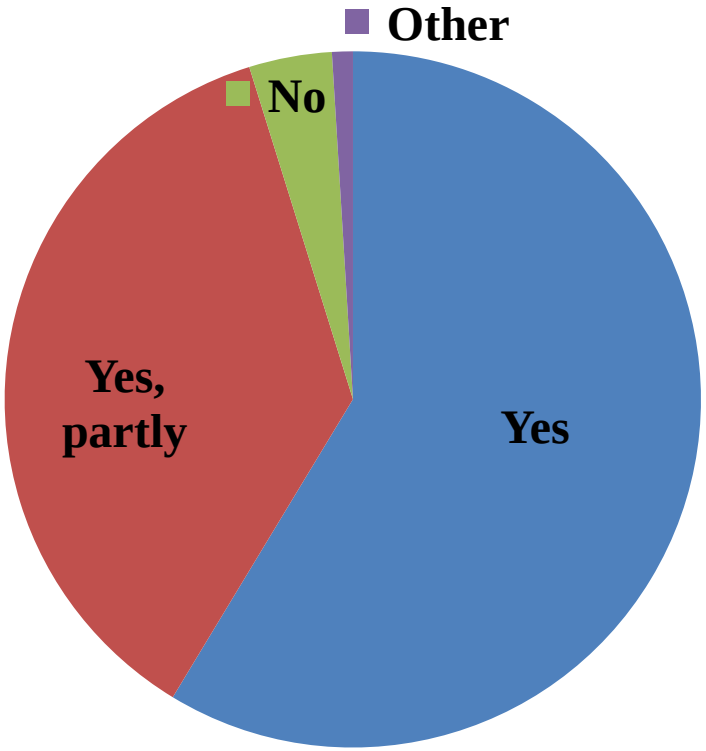
Questionnaire – as a toll for problem detection

- Forest Research Institute (IBL) + State Forests-National Forest Holding (PGL LP)
- Anonymous, web based, easy
- Dedicated to Forest Districts with SO
- 12 question about:

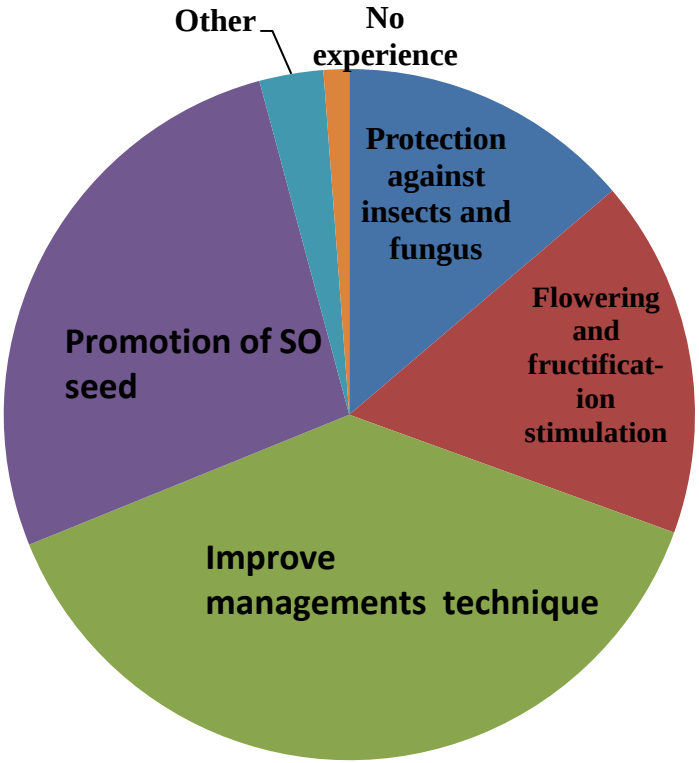
- Establishment SO
- Protection
- Management
- Exploitation of seed

Example questions

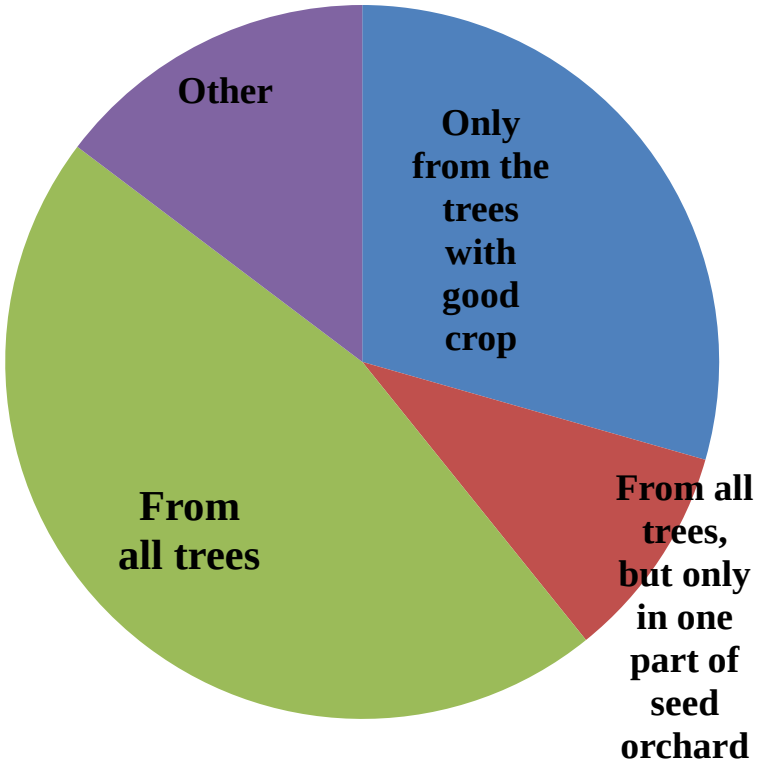
Are seed orchard deliver good quality of FRM?



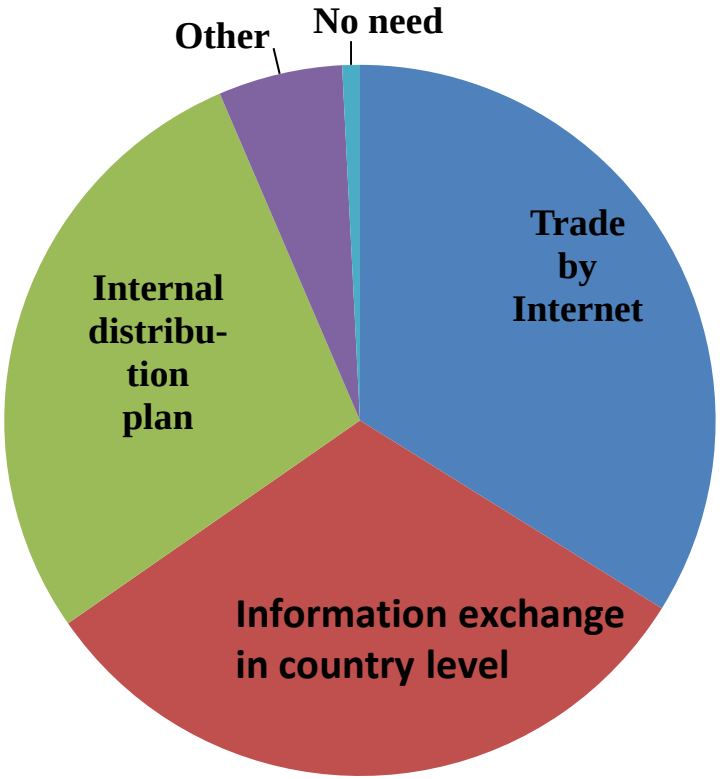
What to do to better manage the seed orchard?



Collection method?



What measures in your opinion support use of more seeds from seed orchard?



Results

- Method of seed orchard management
- Problems with SO
- Needs for flowering stimulation
- Seed using (why?, where?)
- Law change
- Needs new research, concerning seed orchard
- More publications directed to practitioners
- Training needs for seed orchard managers

Differences in SO strategy

- Limited seed use (5%)
- Orchard creation - plan
- No crown pruning
- Only phenotypic selected tress
- Management in small units – Forest Districts
- Financing – all cast refunded from national forestry found

- Increased use (x 8) 40%
- According needs
- Crown pruning – if reasonable
- Mostly clones with known breeding value
- Management on big unit, regional or country
- More marketing and cost efficiency analysis

Done action

- education and popularization of the use of seeds from the SO among foresters (seminars, articles in forestry newspapers)
- creation a series of demonstration plots comparing seed stands and SO
- survey among SO managers

The planed task on seed orchard management include

- verification and categorization of SO (inspection on the ground in terms of their suitability for forest management and potential using)
- redefine the seed regions for SO
- improve seed distribution system (based on Internet application) and closer connection it with a large containerised nursery as well as preparing offer for international seed market

Conclusions

- We hope that measures already taken and planned will allow for better use of SO in Poland.
- Long term tree breeding and seed orchards interface and depend on each other.
- Seed orchards is the better method to deploy progress of tree breeding into forests, that why they are important