



Use of Greenhouse Biobeds in China

Gao Wenxuan

Lab of Agro-waste to Resouce(LAR)
Agro-Environmental Protection
Institute, Ministry of Agriculture(AEPI)
Tianjin, P.R.China

Basic information of AEPI



Main Research area

- ❖ **Remediation of the heavy-metal polluted agricultural soil**
- ❖ **Recycle the agricultural waste**
- ❖ **The index and criterion research of agricultural environment monitoring**
- ❖ **Sustainable agriculture (Including ecological agriculture, climate change research and transgenic crops risk assessment)**



Field Station



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Greenhouse vegetable planting in China



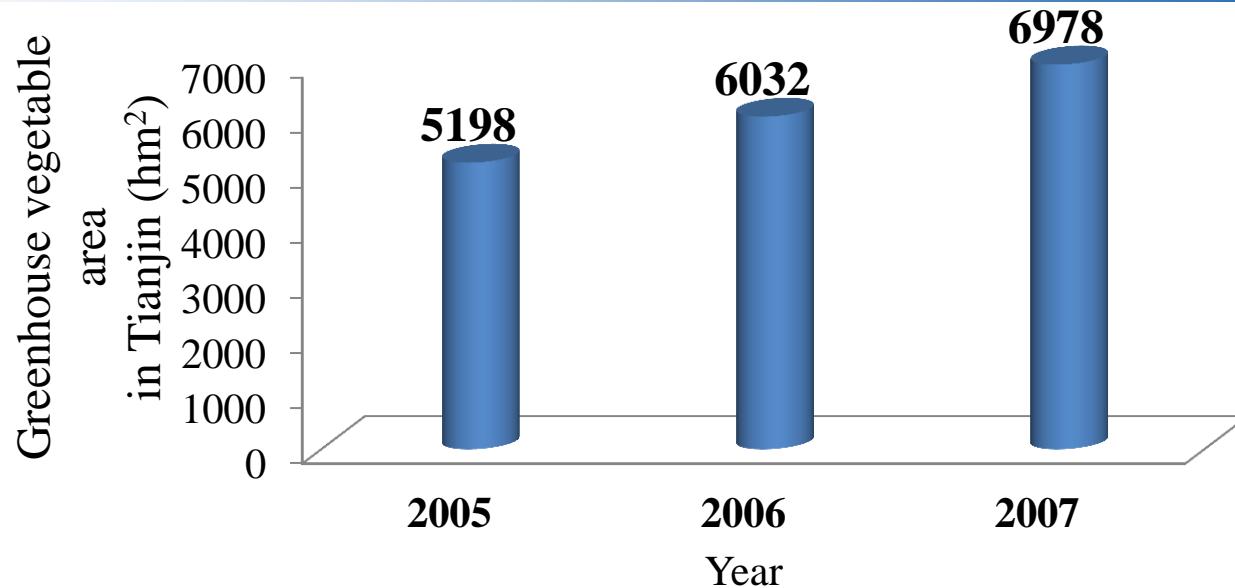
Total growing area
3.35 million hectares

Total production
247 million tons
In 2008

China Fruit and Vegetable 2009-05

www.jnagri.cn

Greenhouse vegetable planting in Tianjin

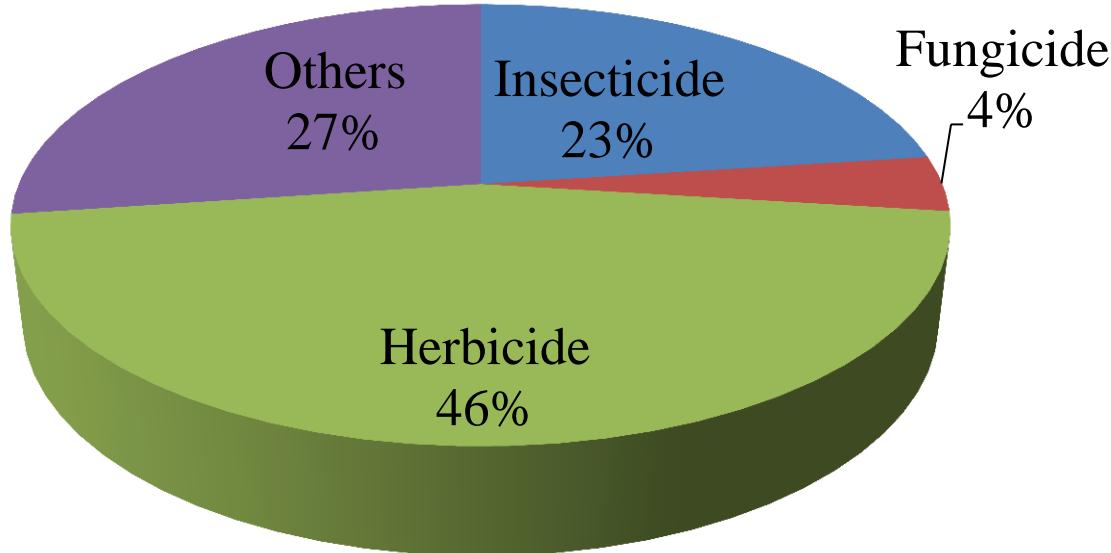


Greenhouse
vegetable base in
Daliang town
Wuqing District,
Tianjin (66 hm²)



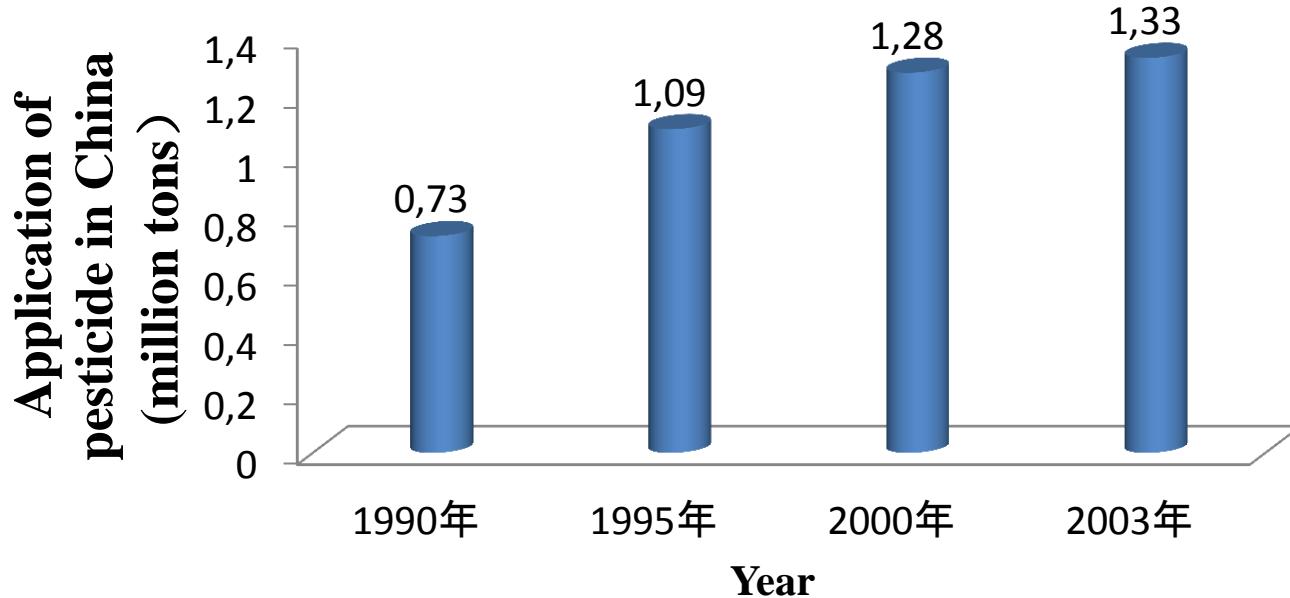
Situations of Pesticide use in China

Pesticide Production in China



Pesticide production in China is 2.57 million tons in 2012, from Jan. to Sep.

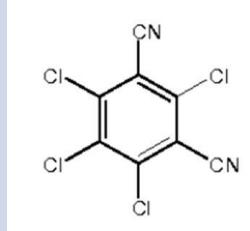
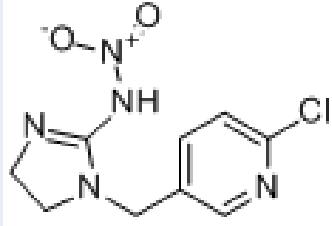
Situations of Pesticide use in China



Pesticide used in the vegetable greenhouse in Wuqing district, Tianjing

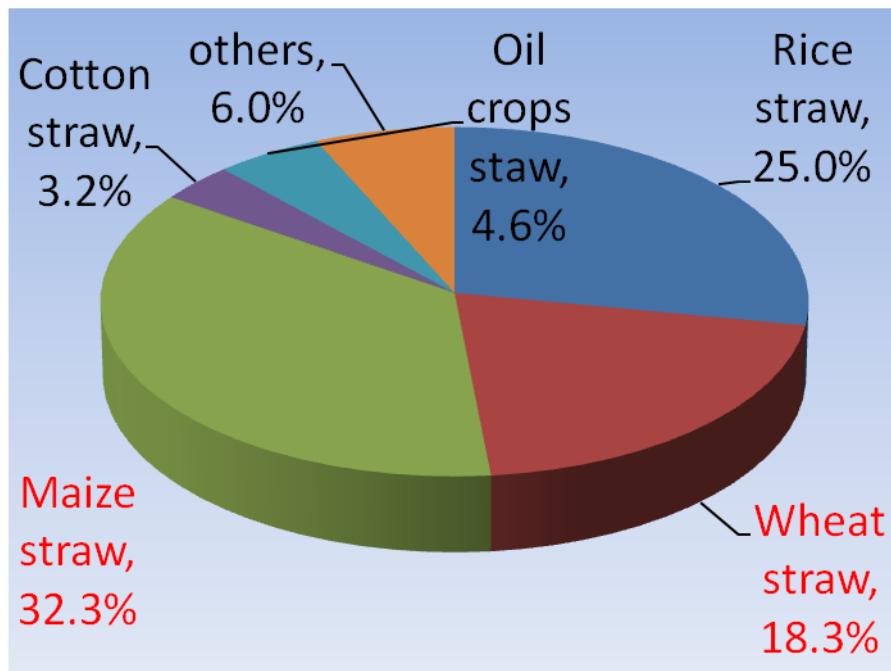
Chinese name	Commercial name	Active substance
百草枯	Paraquat	Paraquat
嘧菌酯	Amistar	Azoxystrobin
烯酰吗啉	Dimethomorph	Dimethomorph
吡虫啉	Imidacloprid	Imidacloprid
苯磺隆	Tribenuron methyl	Tribenuron methyl
百菌清烟剂	Chlorothalonil	chlorothalonil
15%腐霉利烟剂	procymidone	procymidone
春雷·王铜	Kasumin+Bordeaux	Kasumin(47%),Bordeaux(50%)
福·福锌	Thiram+ziram	Thiram+ziram
甲霜·霜霉威	Metalaxyl+Propamocarb	Metalaxyl(15%)+Propamocarb(10%)
灭蝇胺	Cyromazine	Cyromazine
苯甲·嘧菌酯	Azoxystrobin+Difenoconazole	Azoxystrobin(12.5%)+Difenoconazole(32.5%)
精喹禾灵	Quizalofop-P-ethyl ¹⁰	Quizalofop-P-ethyl

Pesticides used in the Lab Test

Commercial name	Active substance	Production in China (2011)	Feature	Function
Chlorothalonil	 2,4,5,6-tetra chloro-1,3-benzene dicarbonitrile	10.4 kt	One of the most widely used foliar fungicides in the world; High efficiency; Low toxicity; Broad-spectrum.	Fungicide Prevention and treatment of downy mildew, anthracnose, blight for vegetables.
Imidacloprid	 1 - (6 - chloro - 3 - pyridyl methyl) - N - phosphite nitrate imidazole hydride - 2 - base amine	11.4 kt	High efficiency; Long duration; Low toxicity. Quick-acting.	Insecticide Prevention and treatment of thorn sucking mouthparts pests for cotton, rice, vegetables and a variety of fruit trees.

Survey of Biomixture substrate

Straw



In 2009, the total yield of straw is 770 million tons.

From *China Statistical Yearbook*, 2009

Peat

Easy to get by purchase
About 0.5 Yuan RMB/kg

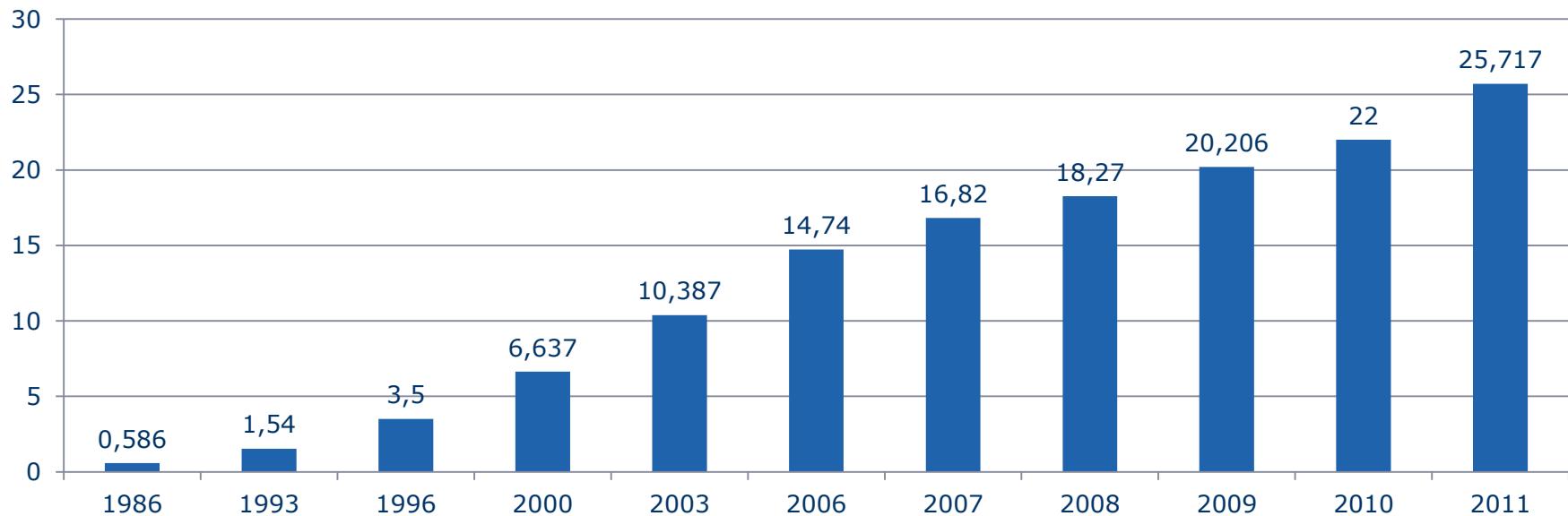
Mushroom residue

In 2011, the total yield of mushroom is 25.7 million tons, and about 14 million tons residue were generated without proper utilization

www.farmer.com.cn

Survey of Biomixture substrate

Mushroom yields In China (10^6 tons)



The composition of the biomixtures

	Biomixture	Content by volume/%
MPS	Maize straw: Peat: Soil	50:25:25
MRS	Maize straw: Mushroom residue: Soil	50:25:25
WPS	Wheat straw: Peat : Soil	50:25:25
WRS	Wheat straw: Mushroom residue: Soil	50:25:25
Control	Soil	100

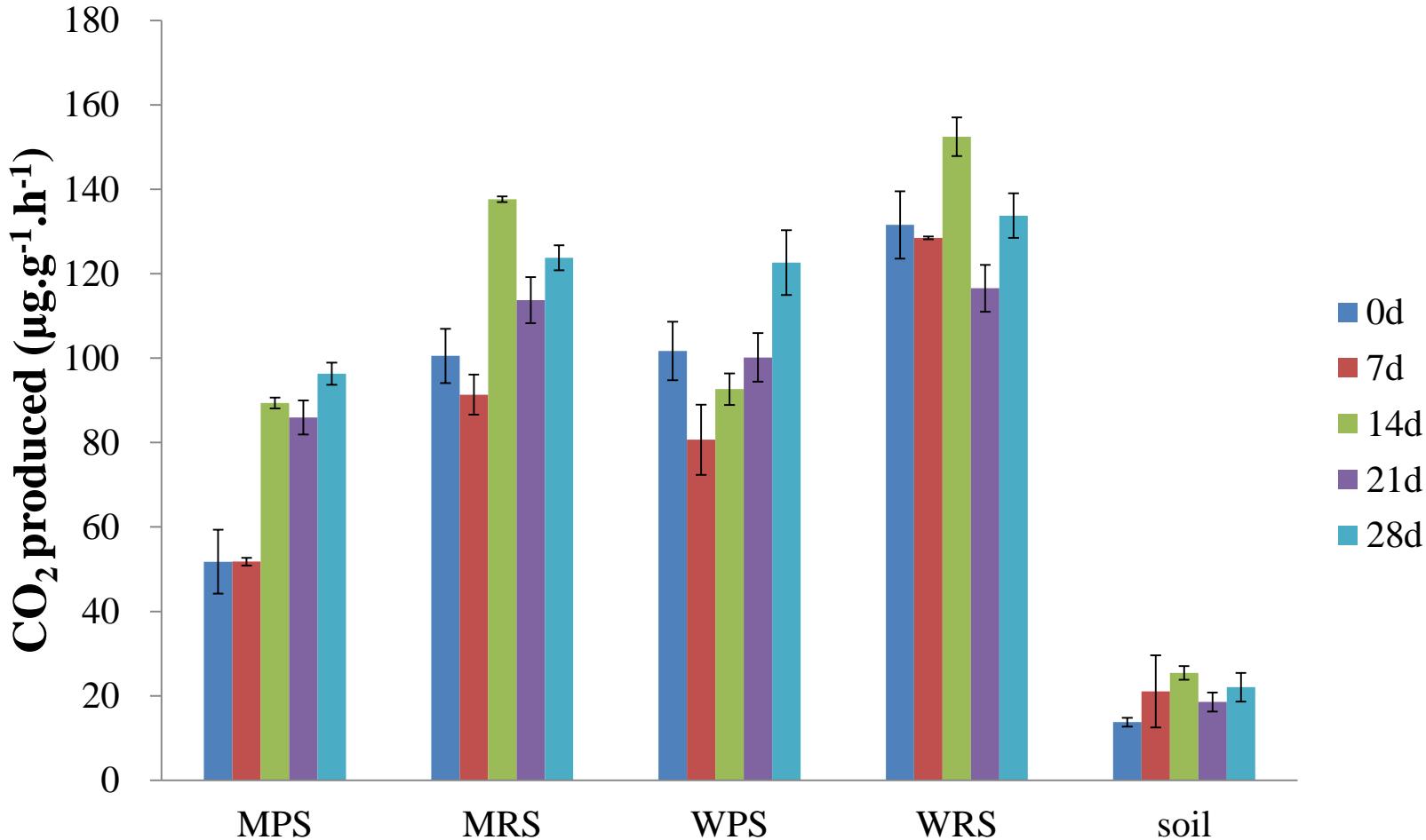
Physicochemical Characteristics of the Substrates and Biomixtures Used in the Experiment

Substrate	Density (g/ml)	pH	Org C (%)	N (%)	C/N
Soil	1.112	8.05	1.18	0.09	13.11
Fresh maize straw	0.375	8.06	40.93	1.48	27.66
Wheat straw	0.107	6.34	44.19	0.66	66.95
Peat	0.280	5.48	40.44	1.50	26.96
Mushroom residue	0.245	5.68	46. 33	1.85	25.04
Maize straw: Peat: Soil	nd	7.67	7.14	0.37	19.30
Maize straw: Mushroom residue: Soil	nd	7.15	5.80	0.44	13.18
Wheat straw: Peat : Soil	nd	6.93	8.50	0.34	25.00
Wheat straw: Mushroom residue: Soil	nd	6.56	10.53	0.41	25.68

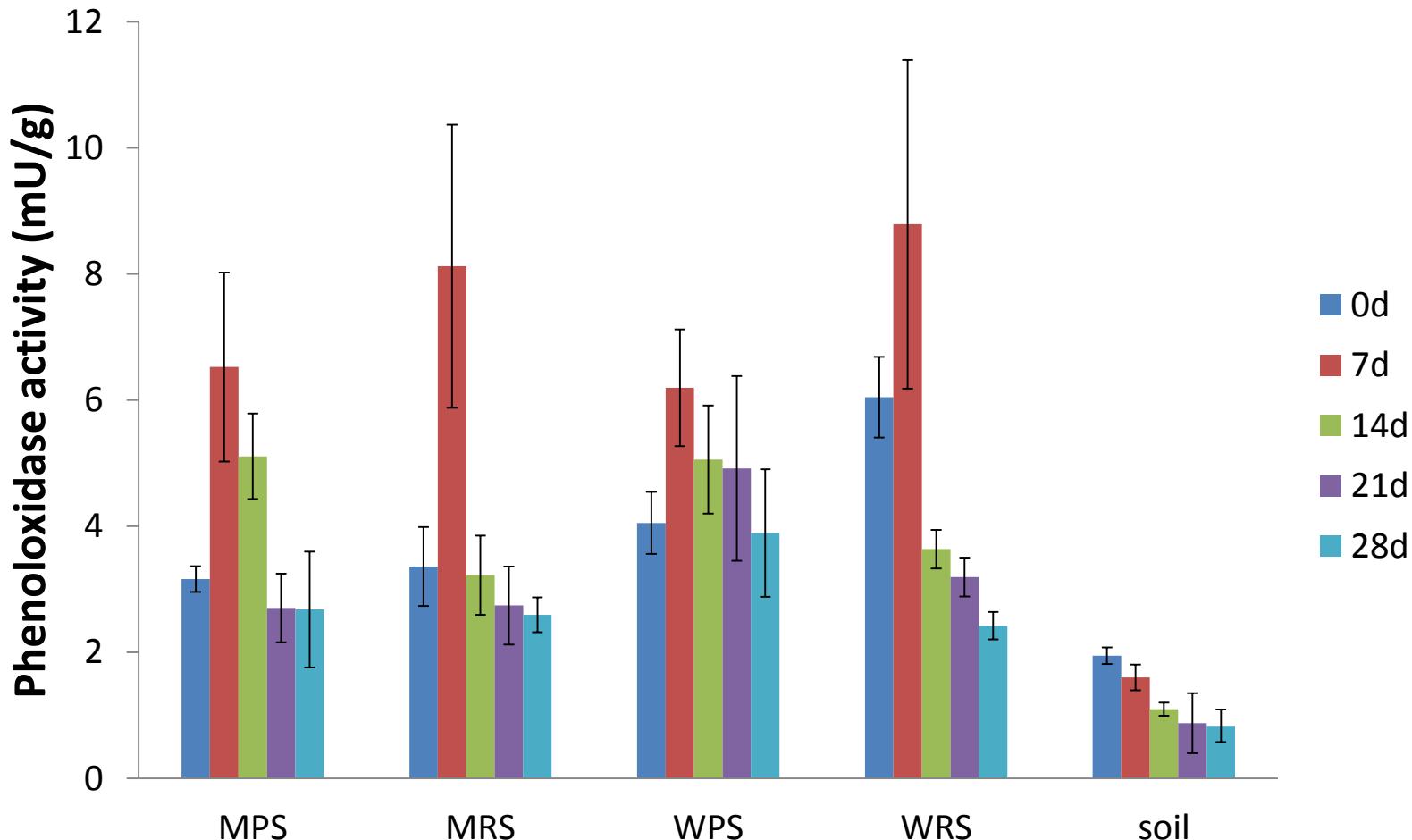
Substrates



Microbial Respiration



Phenoloxidase Activity



DT₅₀ of two pesticides degradation after 28 days

Biomixtures	DT₅₀ (C₀=100 µg/g)	
	Chlorothalonil	Imidacloprid
MPS Maize straw: Peat: Soil	3.51	22.57
MRS Maize straw: Mushroom residue: Soil	4.50	30.49
WPS Wheat straw: Peat : Soil	2.82	25.45
WRS Wheat straw: Mushroom residue: Soil	3.00	30.21
soil	48.08	333.33

Conclusion

- ❖ **Substitution of peat with local mushroom residue will be applicable for the biobed system set-up in northern China**

Next Step

- ❖ **Measure the degradation effects on other common pesticides**
- ❖ **Investigate different types of mushroom residue**
- ❖ **Optimize the composition of substitutions of biomixtures**
- ❖ **Optimize the running parameters of the biobeds system**
- ❖ **Build a demonstration project in the greenhouse for vegetables in Tianjin**



Thank You !