Principles, dissemination, and performance of FBMPs developed in China

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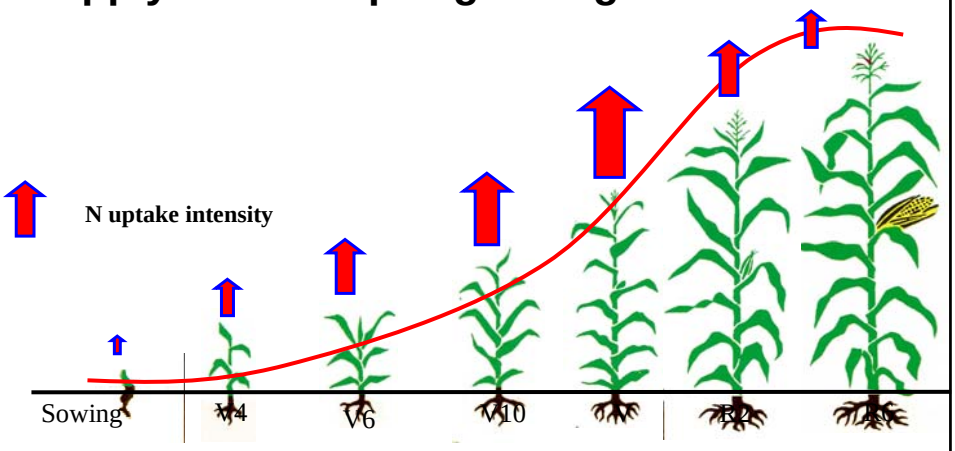
Principles:

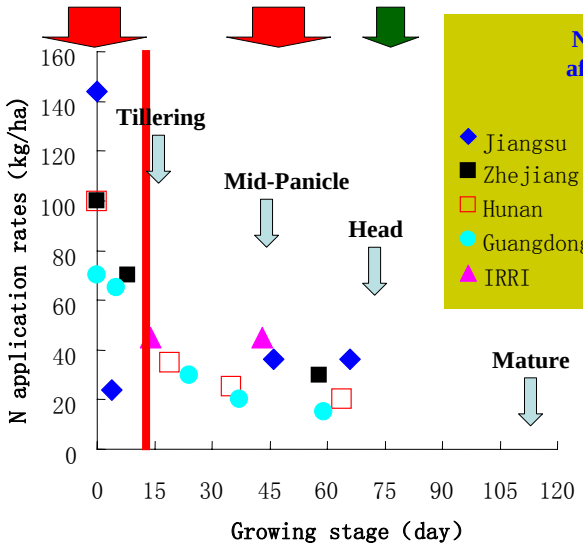
1) Match application to crop requirement, apply when crop is growing fast



Timing of fertilizer application – at time of rapid crop uptake of nutrients

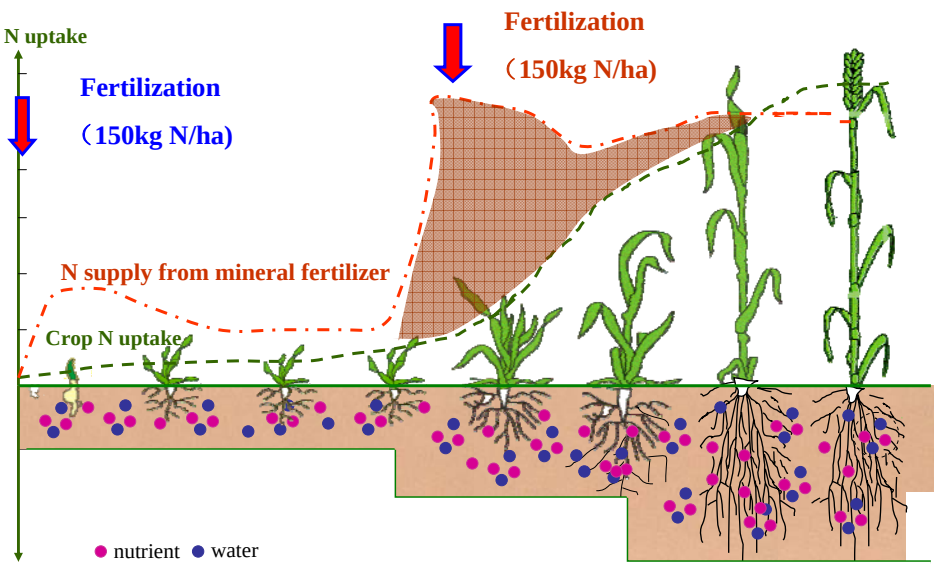
Seems obvious – but often ignored!

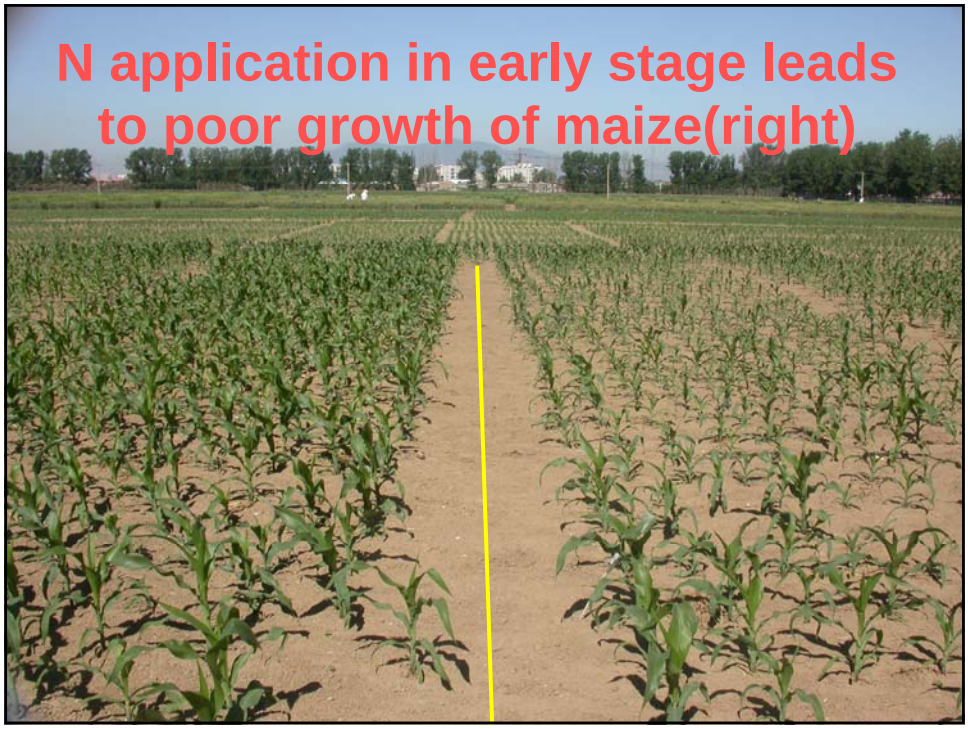
Much was applied before/at planting time!



Problems of farmer's practice in rice production

Problems of farmer's practice in winter-wheat in north China

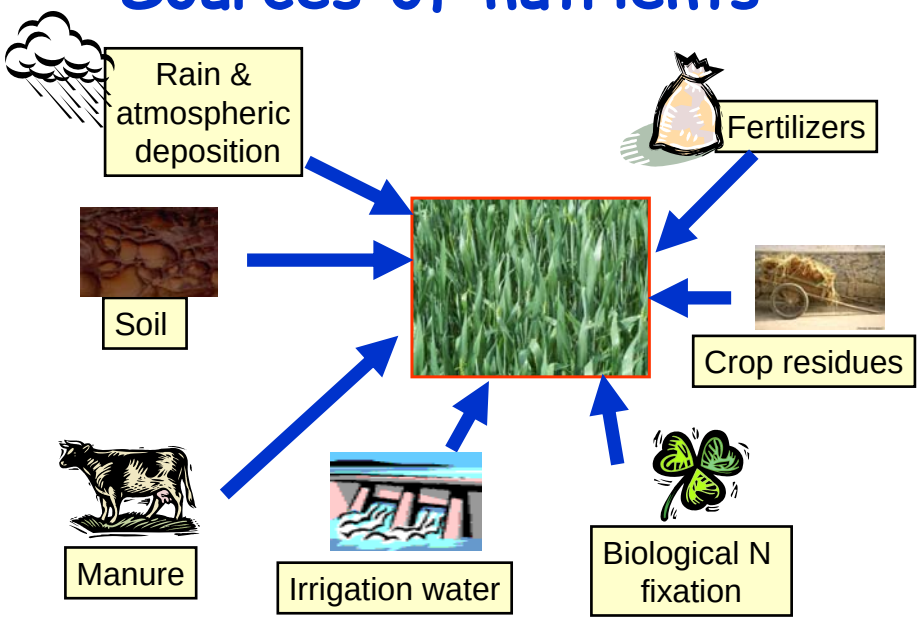




Principles:

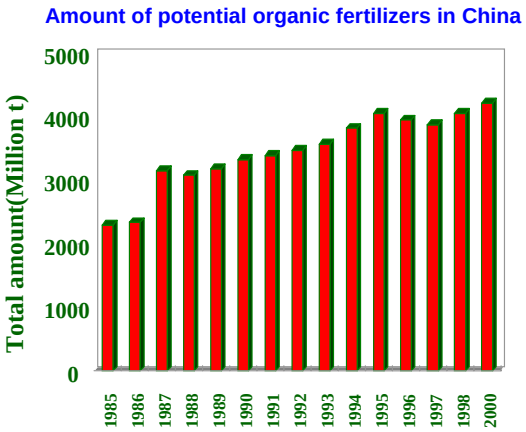
2) Take all possible sources of nutrient into consideration!

Sources of nutrients



Farmer(even expert) never knows that

how much nutrient in organic fertilizer!



NPK nutrient in potential organic sources in 2000: 2869 10^4t N, 1510 10^4tP_2O_5, 2921 10^4t K_2O

Important N source- wet and dry deposition

Wheat-maize rotation in North China Plain：

Annual input (deposition):

60-80 kg N ha^{-1}

Accounting for crop demand of 20-27%

Rice-wheat along the Yangtze River Basin:

Annual input (deposition + BNF):

103-127 kg N ha-1

Accounting for crop demand of 30-40%

Large amount of nitrate accumulated in soil



N in 100cm	384(n=140)	1267(n=140)	651(n=206)
Crop demand	280	329	121

100cm

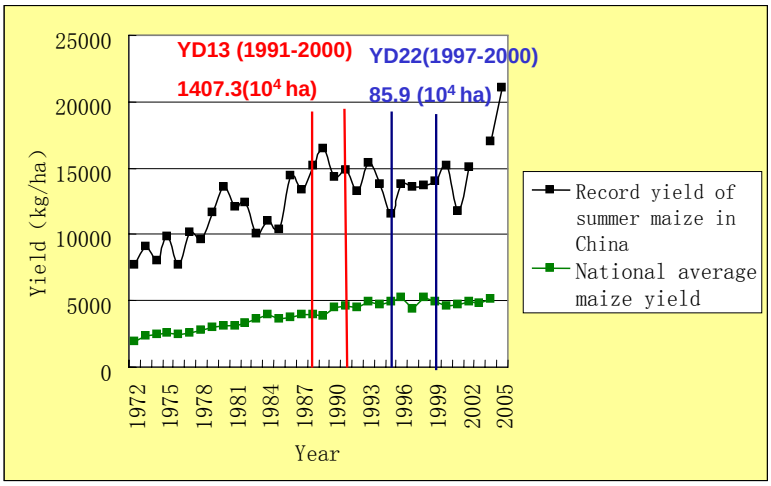
N accumulation as nitrate in 0-100cm soil layer(kg/ha) in cereal, vegetable and fruit production systems in China

Groundwater

Principles:

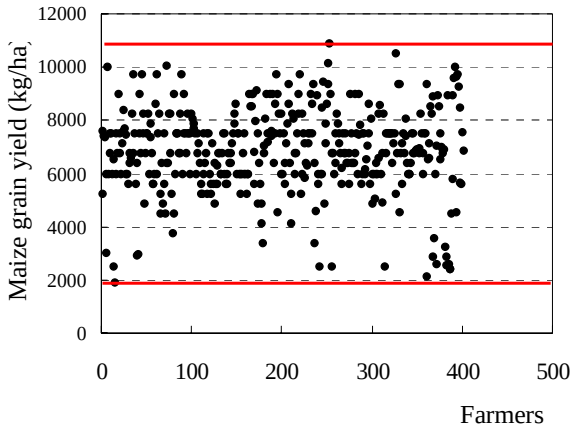
3) Take all possible improving yield and reducing nutrient loss measures into consideration!

A gap in yield



(Li, 2004; FAO; website:http://www.cornexpert.com, http://www.denghai.com/)

Variability of maize yield among farmers

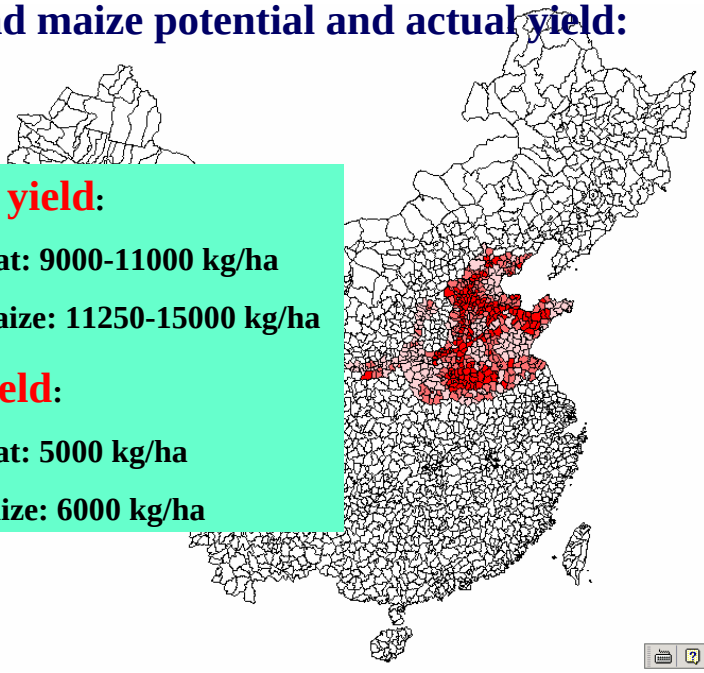


Mean	6651
C.V.	23%
Max.	10875
Min.	1879

n=400

(Shandong Huimin County,2003-2004)

Wheat and maize potential and actual yield:



Potential yield:

Winter wheat: 9000-11000 kg/ha

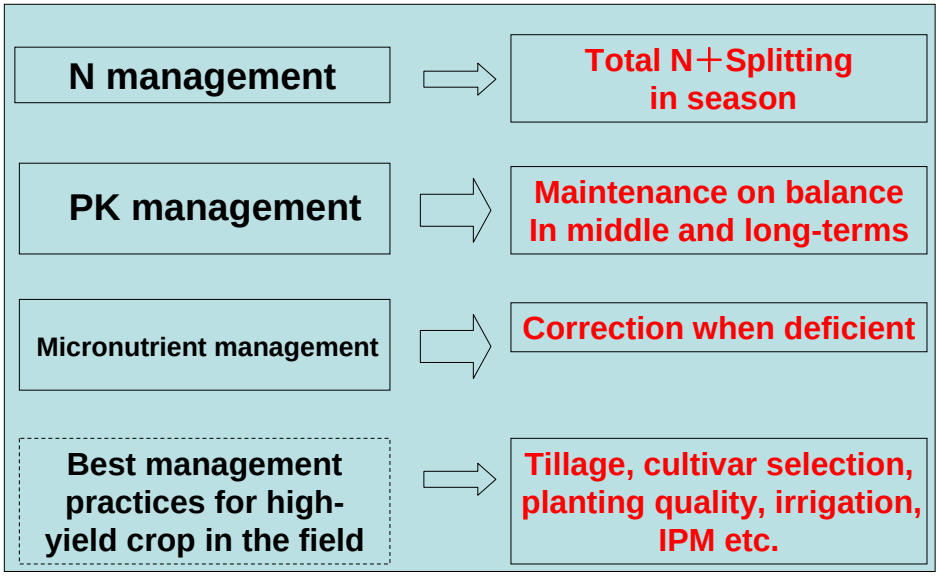
Summer maize: 11250-15000 kg/ha

Actual yield:

Winter wheat: 5000 kg/ha

Summer maize: 6000 kg/ha

Principal and technology of integrated nutrient management



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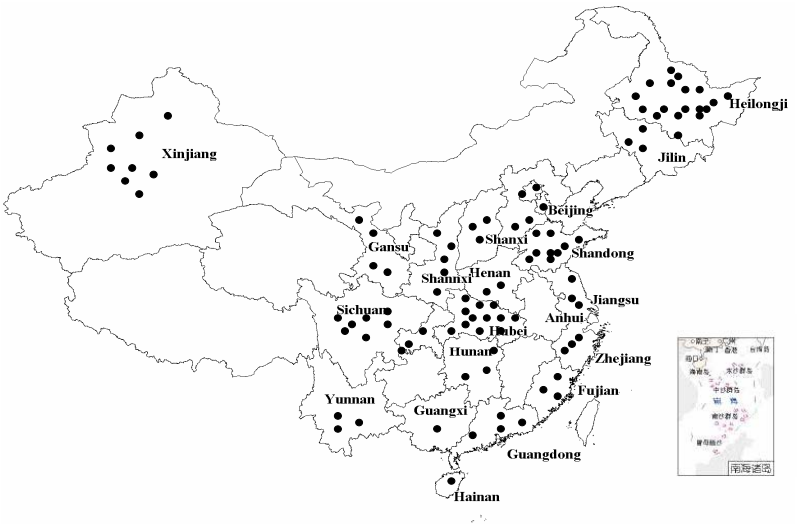


The distribution of 127 experiment and extension bases or stations across 12 cropping systems throughout China

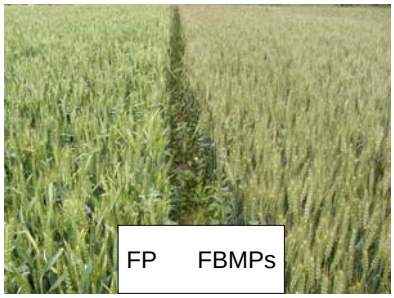
Dissemination of FBMPS

Technical manuals, leaflets and publications for teachers, officers, technicians and farmers

FBMPs dissemination

In cooperation with fertilizer companies

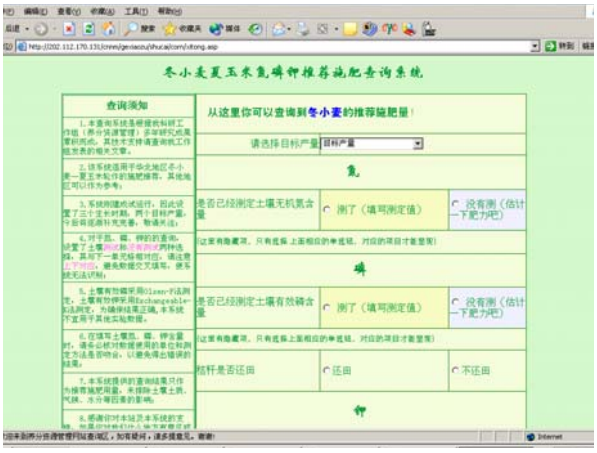
focused on developing new types of fertilizer, investigation of fertilizer market, on-farm surveys of fertilizer application, and training staffs in fertilizer industry and public extension system



Dissemination of FBMPs through farmers' special association at Jianyang base in Sichuan province

FBMPs dissemination

Establishing web site designed for nutrient management planners (www.fertrdc.cau.edu.cn/cnnm)



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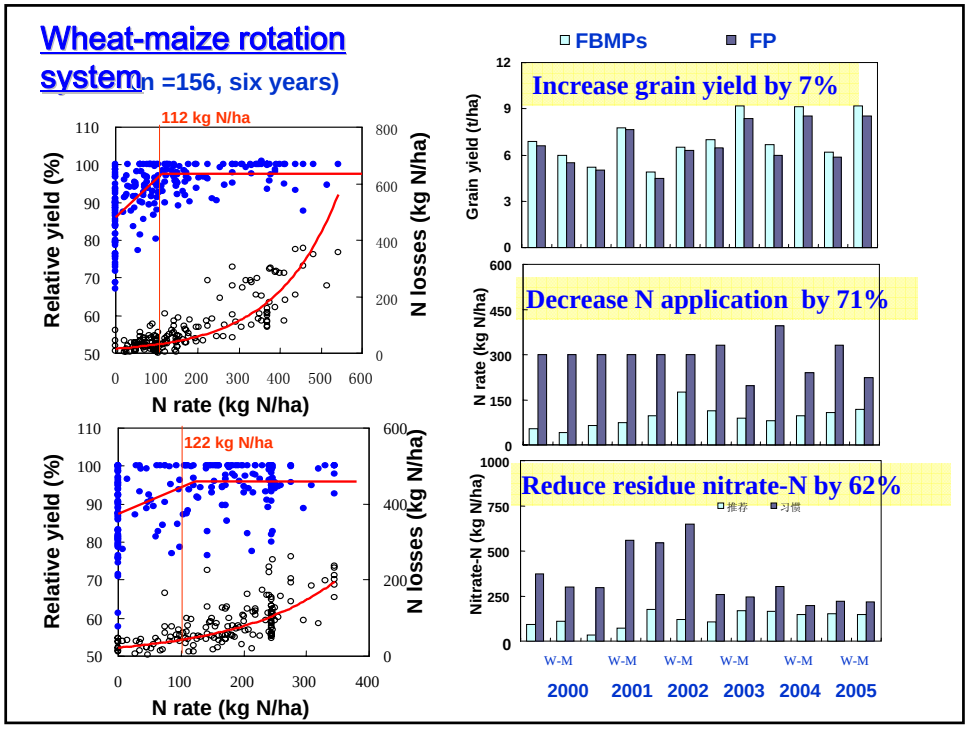


Result of wheat experiment on farm (n=87)

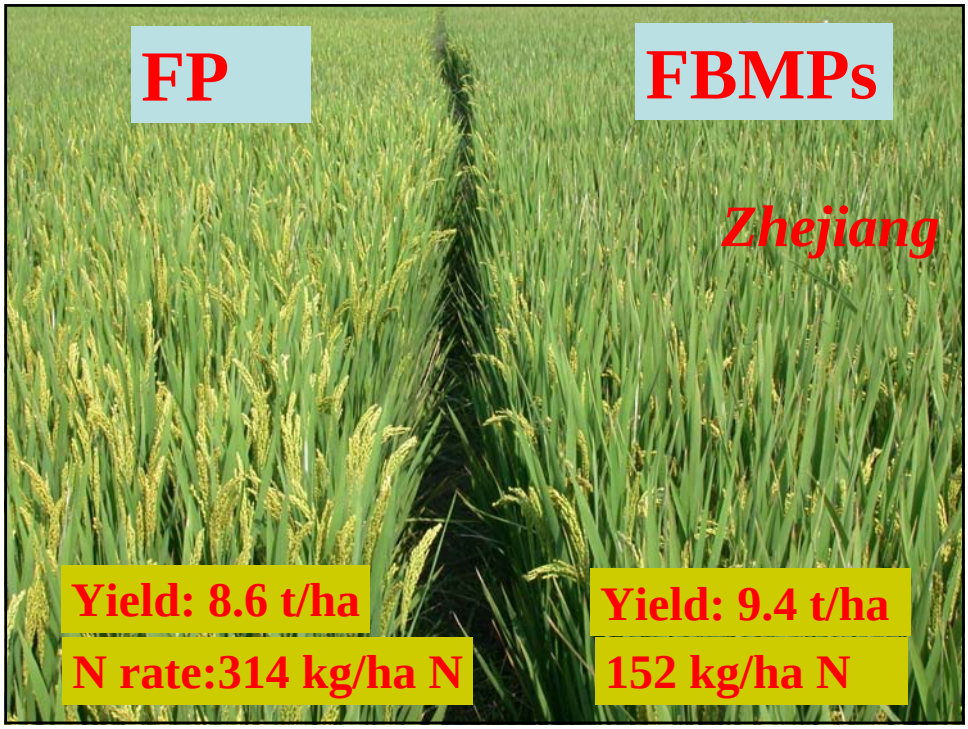
Treatment	N rate (kg/ha)	Yield (t/ha)	N recovery rate (%)	PFP_N (kg/kg)
Control	0	5.9	-	-
FP	356	6.8	20	20
FBMPs	111	6.8	36	72

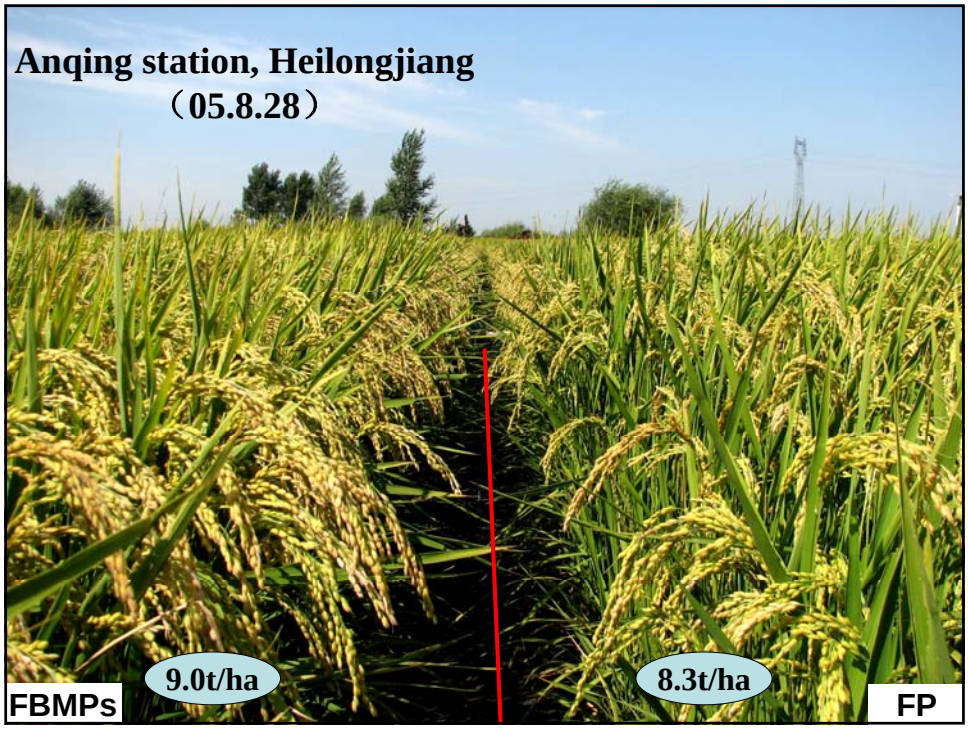
Result of maize experiment on farm (n=189)

Treatment	N rate (kg/ha)	Yield (t/ha)	N recovery rate (%)	PFP_N (kg/kg)
Control	0	8.1	-	-
FP	242	9.2	18	40
FBMPs	180	9.8	25	58

Result of rice experiment on farm (n=55)

Treatment	N rate (kg/ha)	Yield (t/ha)	N recovery rate (%)	PFP_N (kg/kg)
Control	0	5.88	-	-
FP	176	7.48	20	42
FBMPs	123	7.86	35	63


FP
FBMPs
Zhejiang
Yield: 8.6 t/ha
N rate:314 kg/ha N
Yield: 9.4 t/ha
152 kg/ha N


Anqing station, Heilongjiang
（05.8.28）
9.0t/ha
8.3t/ha
FBMPs
FP

Performance of FBMPs

Cropping system	N saving (%)	Yield increase (%)	N recovery increase (%)	N loss decrease (%)
Wheat/Maize rotation	41-59	5-10	12-15	43-69
Rice	22-32	8-12	10-15	40-50
Vegetable	30-50	2-10	5-15	40-65
Cotton	20-30	5-8	10-15	10-30
Oilseed rape	10-30	5-30	8-15	-
Rice/wheat rotation	30-50	8-20	8-30	30-50
Intercropping	20-50	0-10	8-13	20-45
Tobacco	10-30	0-10	7-20	40-50
Apple	10-50	5-15	2-12	-

FBMP treatments on average have saved N by 20-40%, increase yields by 2-12%, increase N recovery rates by 10-15%, and decrease N losses by 10-50%

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Technologically, FBMPs is a feasible solution to tackle or alleviate the problems of fertilizer overuse and misuse in cropping systems.

What are the determinants of the use of fertilizers by farmers?

Politically

- **High input and high output policy leads to higher use**
- **Modern varieties make it possible to apply more fertilizer**
- **Current extension system leads to higher use**

Perspectives

Change policies :in agriculture and fertilizer industry

- –Develop and extend fertilizer saving technologies
- –Train farmers
- –Reform current public agricultural extension system:
  - •Stop the business of public agricultural extension agents
- –Make new technology policy:
  - •Encourage the development of fertilizer-sensitive technologies

Acknowledgments

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Thanks

for your attention !