Seed-Film Cultivation (SFC)

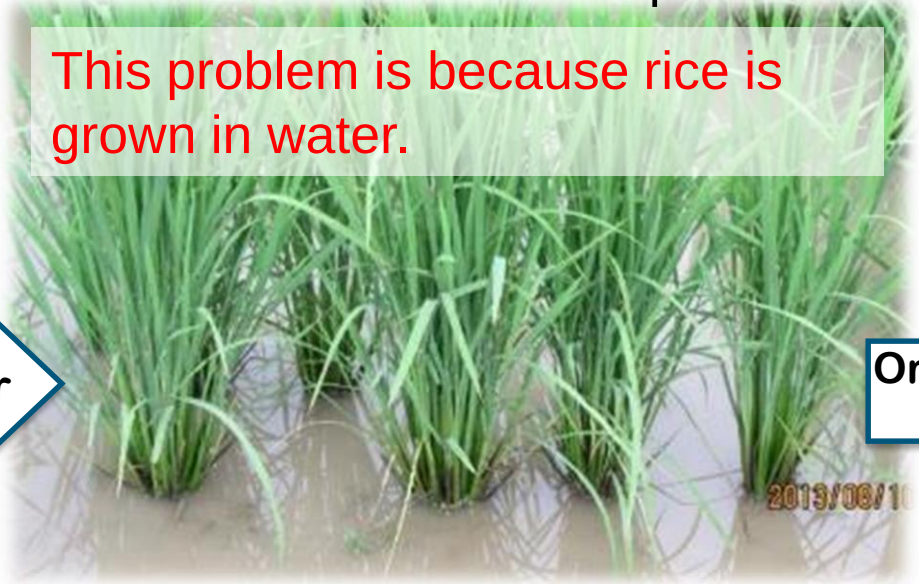
GREEN AND SEED

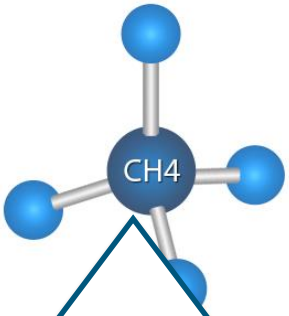
48, Sinseong-gil, Deokjin-gu, Jeonju-si, Jeollabuk-do, Republic of Korea
Homepage: https://www.seedfilm.co.kr/en | E-mail: jikpa@naver.com
Tel: (+82)10-9227-4976 | LinkedIn: www.linkedin.com/in/sungjin-choe

Irrigated rice cannot and should not continue in climate change

100 cm of water

10,000+ tons of water use and
10 tons of GHG emissions per hectare





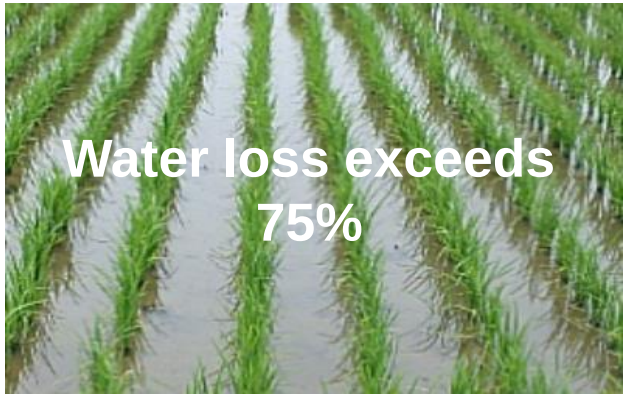
Organic matter-rich water

Rice production should increase, but climate change will bring it down

World Rice Production Status
(Rice Almanac 4th Ed. 2013)

Ecosystem		Area (M ha)	Ratio	Yield (tons/ha)	Scalability
Irrigated		93	75%	5.5	Rather decreasing due to climate disasters
Rainfed	Lowland	52	19%	2.3	
	Upland	14	4%	1	600 million ha of uncultivated arable land in Africa alone

More than 75% of the water is wasted



Classification of water use		※1	※2	
	Transpiratione	57%	40%	24%
	Evaporation		60%	Loss
	Percolation	43%		
	Seepage			
	Tail water spill			

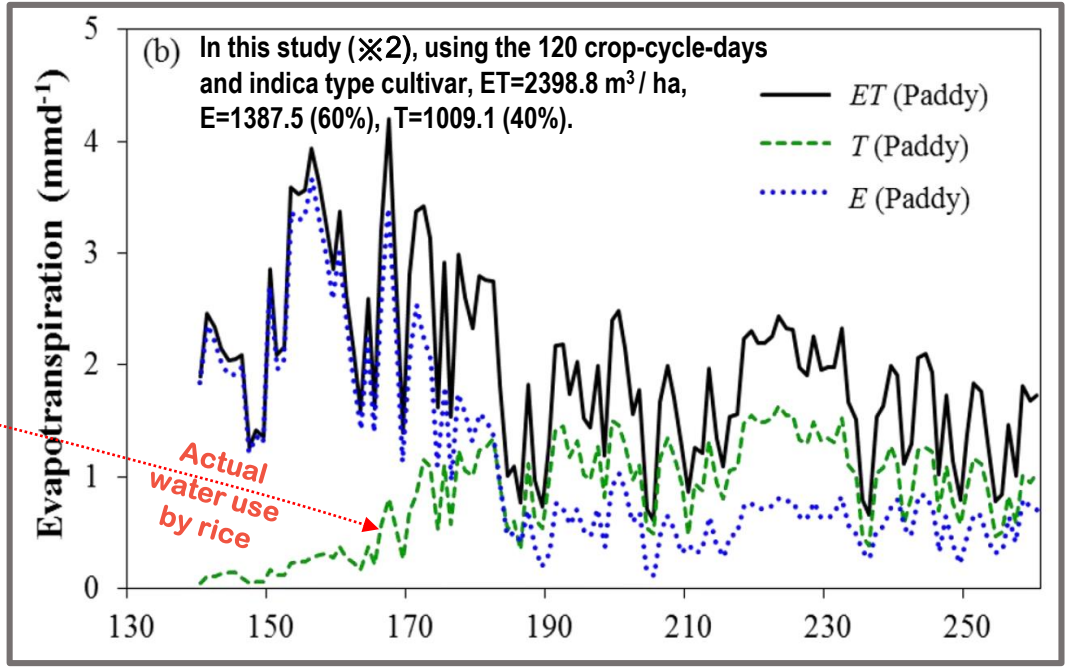
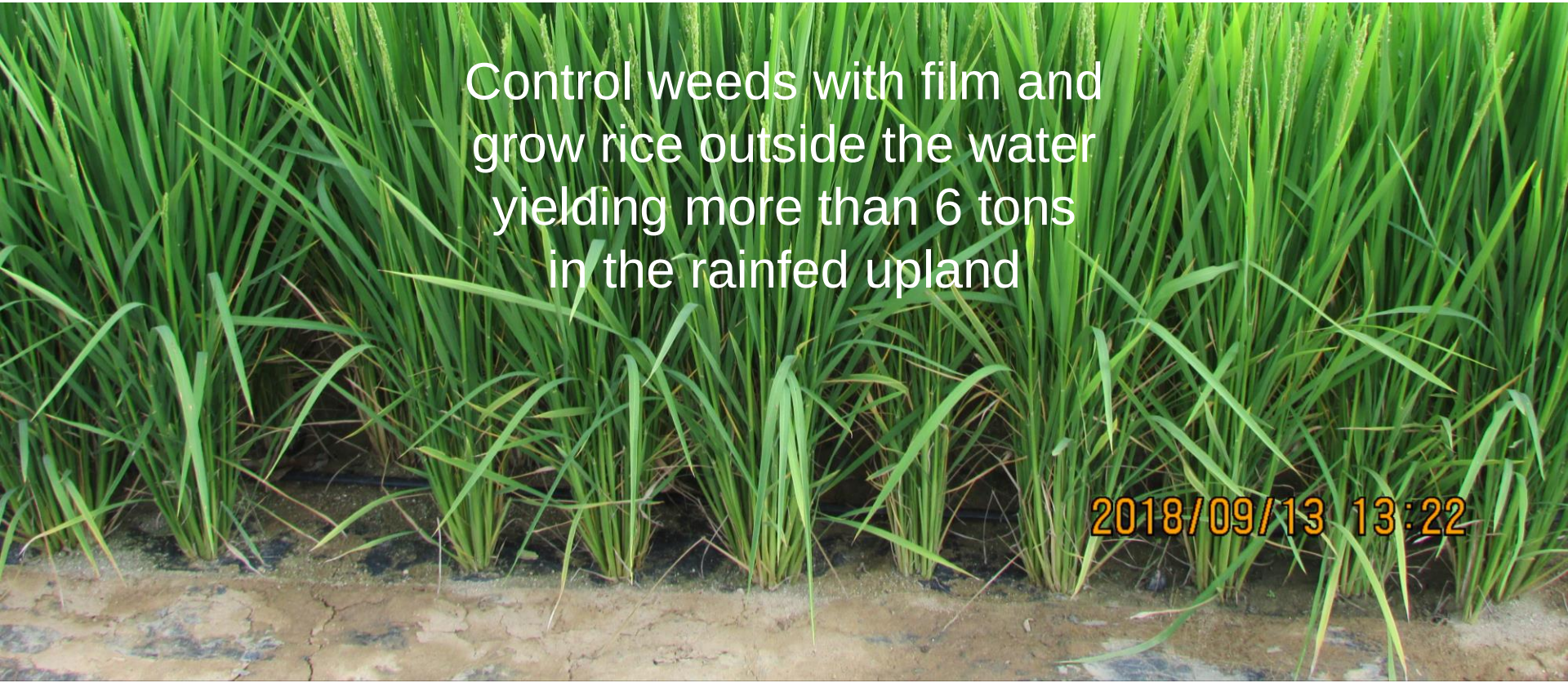


Figure V-2 Daily evapotranspiration (black line), canopy transpiration (green dashed line) and evaporation (blue dotted line) of paddy rice (b). (n=3, +/-SD)

※1. http://rice.ucanr.edu/Water_Use_by_Rice | ※2. Water use efficiency of rainfed and paddy rice ecosystem (2016), Bhone Nay-Htoon, page 63

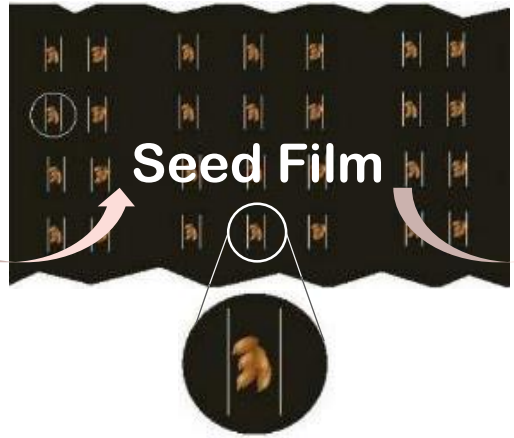
Rice is not an aquatic plant, but just water-intensive



Rice farming with Seed Film Cultivation (SFC) in the Rainfed Upland ecosystem

Technology; Seed Film and Seed Film Cultivation (SFC)

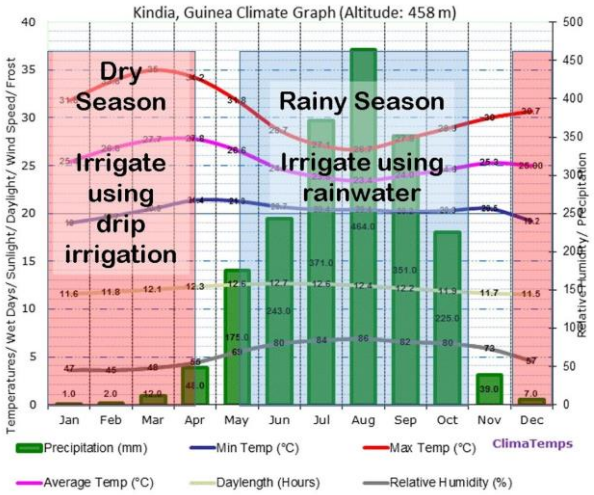
14 ha/day, 400 ha/mo., 2,000 ha/yr. for 5 months



Biodegradable Film	The film will be 90% decomposed for 180 days and completely disappears with 100% water and CO2, leaving nothing. Resins; PLA (Polylactic acid) + PBAT (Polybutylene adipate terephthalate) + TPS(Thermoplastic starch) Width; 1.8M | Thickness; 12 μm | Weight; 150kg / ha
Eco-adhesive	Eco-friendly adhesive using anhydrous ethanol as solvent, without VOCs (Volatile Organic Compounds)

※The above two materials cost about $600 per hectare on 1,000 hectares or above.

Solution; Seed Film Cultivation (SFC) with Rain



- Under the rainfed upland ecosystem, with abundant rain in the tropical rainforest, savannah, and monsoon, Seed Film Cultivation produce more yields than irrigated rice.
- In the dry season, it can be grown by drip irrigation.

Rice farming with Seed Film Cultivation (SFC) in the Rainfed Upland ecosystem

Advantages; High yield due to spontaneously formed Seedbeds

Seedbeds are essential for good seedlings establishment. But direct sowing is not supposed to have seedbeds. SFC is also direct sowing, but in itself forms seedbeds.

Shortened growth period

- The temperature rises because the heat of vaporization is suppressed by film mulching.
- The temperature drops less due to not having water at night.

Increased Yields

- The seedbeds maximize the number of effective tillers and panicle lengths, resulting in high yields of more than 6 tons of paddy in the rainfed upland.

Advantages; Cost-effectiveness

A Seed-attacher replacing irrigation facilities

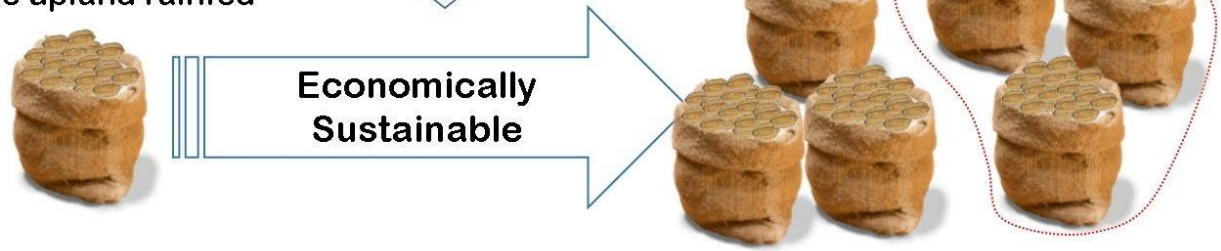
Seed-Attacher is much more economical than irrigation dams and more.

SFC inputs the $600/ha biodegradable films and satisfies the economic feasibility with much higher output.

Film price is expected to fall on mass production.

Costs for the film & fertilizer

So far, 1 ton of rice in the upland rainfed



Estimates are based on paddy rice prices of $ 300 or more per ton.

Advantages; More cost-effective expectations due to climate change

The Washington Post

The world needs a massive carbon tax in just 10 years to limit climate change, IMF says

The international organization suggests a cost of $75 per ton by 2030.

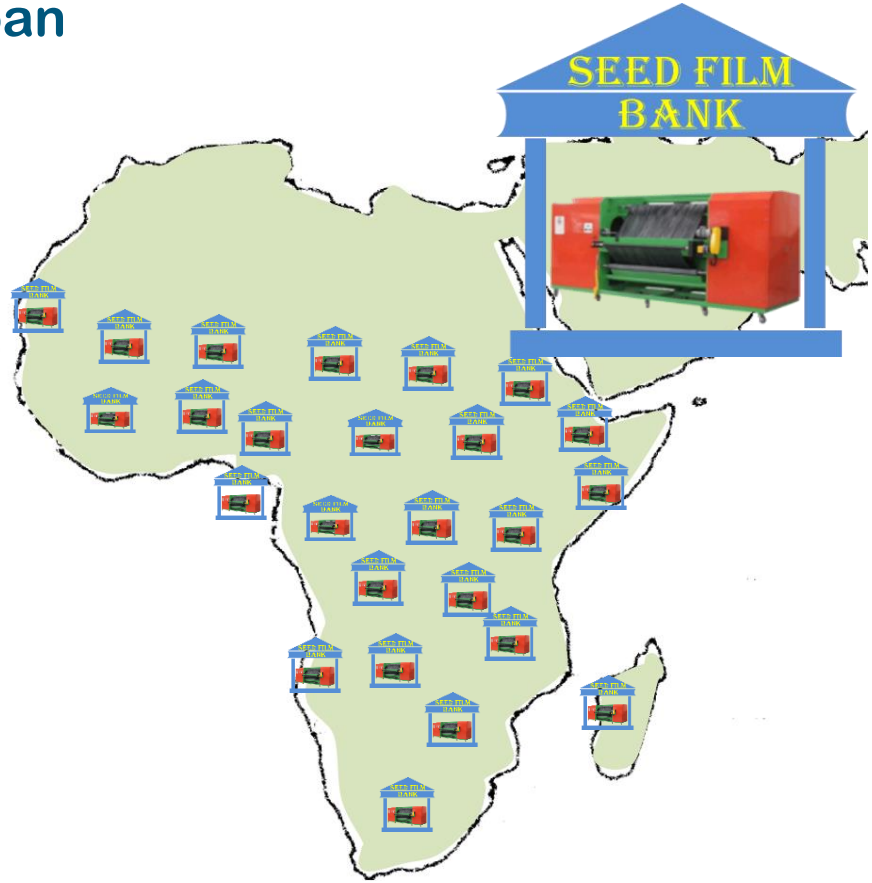
https://www.washingtonpost.com/climate-environment/**2019/10/10/**world-needs-massive-carbon-tax-just-years-limit-climate-change-imf-says/

- Considering that the GWP of methane is 28-36 in US-EPA, about 350-400 kg/ha methane from rice paddy means over 10 tons CO2eq per ha
- The carbon footprint for the biodegradable film is about 1 ton CO2eq / ha

- This article means that SFC farmers are entitled to compensation over $650 / ha ($ 75 / tonCO2eq x 9 tonCO2eq / ha) from the international community, based on recent claims by the International Monetary Fund.

Go-To-Market Strategy; Seed Film Loan

- Our consumers, rainfed-upland-farmers, are clearly expected to need our solution SFC that grow rice outside the water and can yield more rice than irrigated rice farming. But it is virtually impossible for the subsistence farmers to grow rice using a Seed-attacher.
- Seed Film Loan is devised to make it easy for the farmers to participate in Upland SFC.
- A Seed-attacher can produce 2,000 hectares of the Seed Film a year and must run 24/7 at a plant where stable electricity can be supplied. This is the role of the Seed Film Bank.
- The Bank manufactures Seed Films, lends the films and fertilizers to small farmers, and lets the farmers grow rice to produce more than 6 tons there. Then the farmers pay for them with 3 tons of paddy after harvest. This method is repeated and expanded continuously in a cyclic manner. In this way, farmers will make profits and expand farming area.



Zero Methane Rice sales

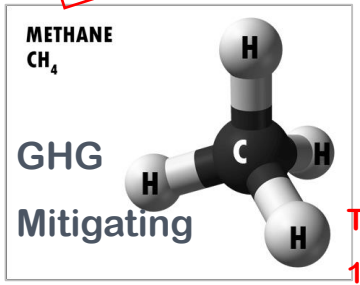
Saving 50%

Minimal

Hazardous Chemicals

Cha-khan-rice

Zero CH4



Traditional emits 10tCO2eq/ha,

- Cha-kan rice grown with SFC is good rice with a low environmental load by reducing water usage and GHG emissions. Additionally, it is a direct sowing, which saves a lot of labor compared to the transplanting farming method. In particular, by controlling weeds with film mulching, SFC can greatly reduce the toil of weeding by children and women.
- This rice deserves a fair and must be widely disseminated.

.※'Cha-khan 착한' means 'good' in Korean

Team; Green and Seed Corporation and History of Seed Film Cultivation

2019.03.03 Green and Seed Corp.
Established (Initial Capital $ 45,000)
Founder and CEO Sung-jin Choe
Specialty; Rice farming, CAD / CAM
2015 Korea National Railroad College dropout
2017 Grand prize at 3rd Innovation Festa
2018 MIT-SOLVER
https://solve.mit.edu/challenges/coastal-communities/solutions/4182

After successfully growing rice in corn / wheat fields in China since 2017, the team convinced that SFC could solve the problem of continuous flood irrigation. CEO applied for the SOLVE Challenge of the Massachusetts Institute of Technology and was selected as an MIT-SOLVER 2018.

① 2009-2012,
Rice transplanting with mulching biodegradable film

② 2012, Invention of Seed-attacher and Wet Mulcher

③ 2012-2015,
SFC in wet paddy

④ 2015,
Invention of Dry Mulcher

Rice farming with Seed Film Cultivation (SFC) in the Rainfed Upland ecosystem

2017, SFC in the former corn fields in Hebei Province, China

Area : 1200 m^2


2017.06.0
7

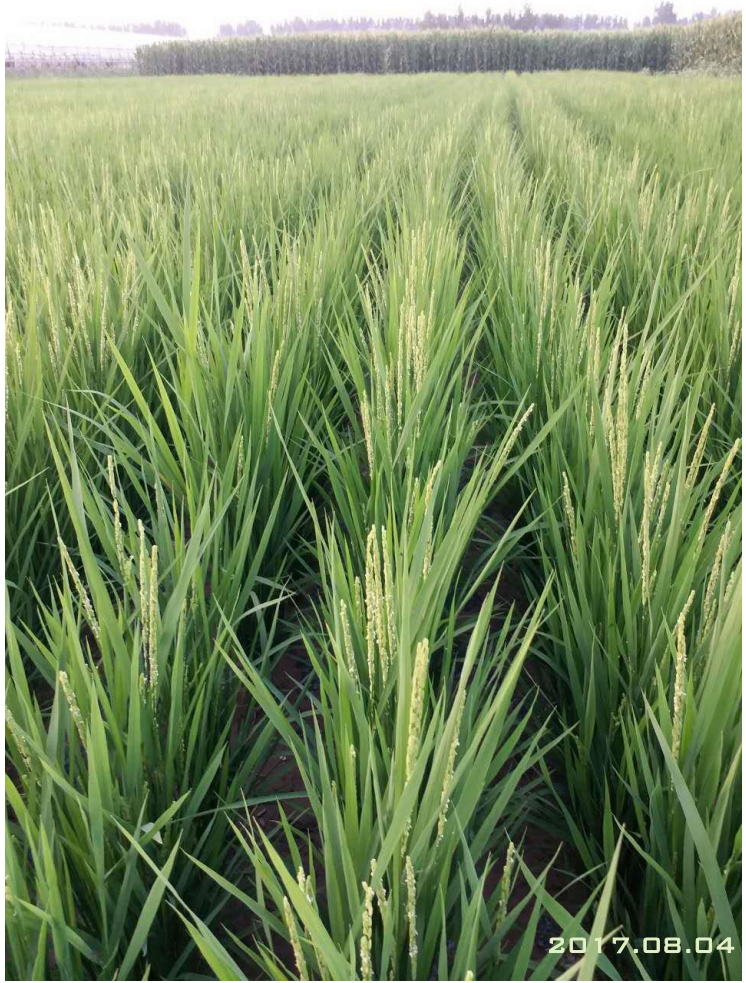

2017.06.21


2017.07.0
1


2017.07.10


2017.07.15


2017.07.21


2017.08.04


2017.08.13

2017.09.14 Harvest Event
CCTV (China Central TV) broadcast the event

2018, SFC in the former wheat fields in Hebei Province, China

Area : 66,600 m^2


2018.05.13


韩国GREEN&SEED公司
涿州市荣亨农业科技有限公司
热烈欢迎领导及各界友人莅临指导
2018.07.09


2018.07.09


2018.07.31


2018.09.11


2018/10/20

2018, SFC at the foot of a mountain in Yeoju, Korea

Area : 600 m^2


2018/06/12 09:29


2018/07/05 08:41


2018/07/29 08:01


2018/07/29 08:05


2018/08/22 08:15


2018/09/13 13:20


2018/09/13 13:26