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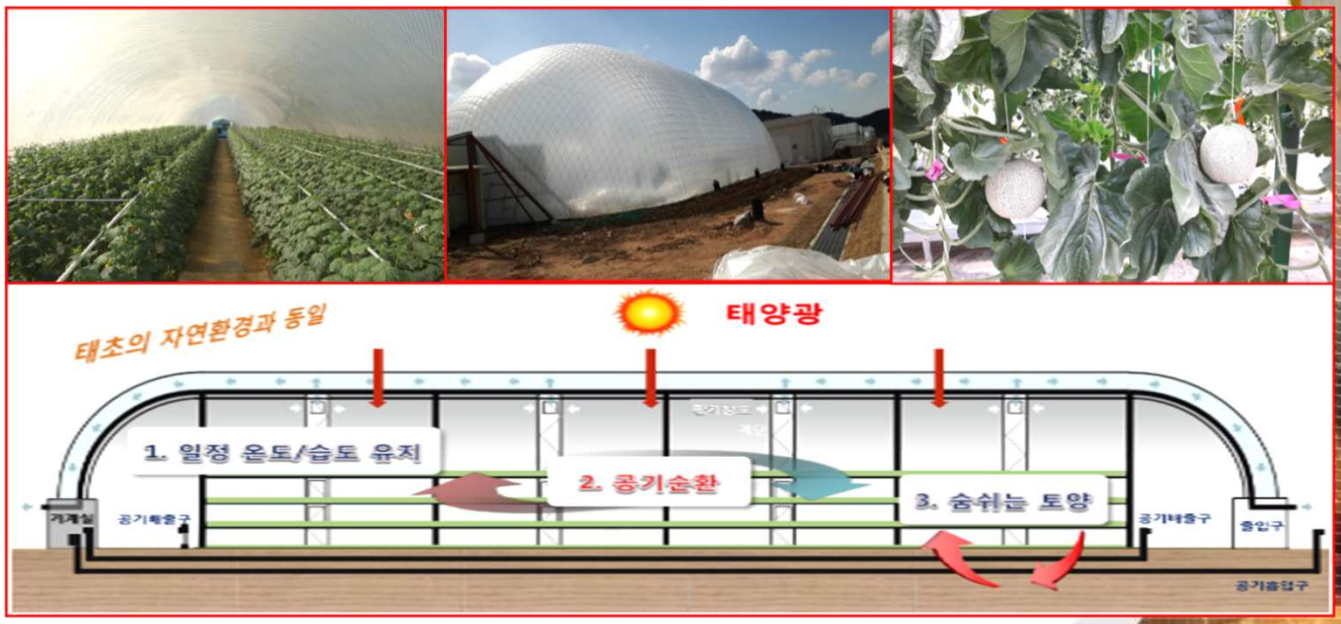
AIR-DOME PLUS

HIGH-INCOME ECO-FRIENDLY AGRICULTURE USING AIR DOME



AIR-DOME PLUS CO., LTD

Version : 2022.07.24 ★ gyuchan9347@naver.com / 010-5287-8870

AIR-DOME OVERVIEW

1. WHAT IS AIR-DOME?

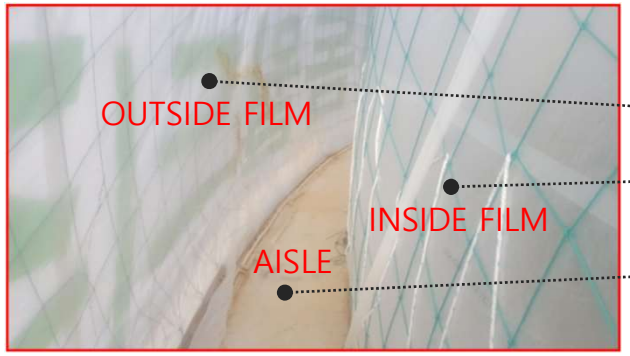
By creating a space of about 1M between two special vinyls installed on the ground, and injecting air between them to expand Agricultural facilities in which the structure is maintained only by air pressure without columns or beams inside the facility,

FOR AGRICULTURE (OUR'S)

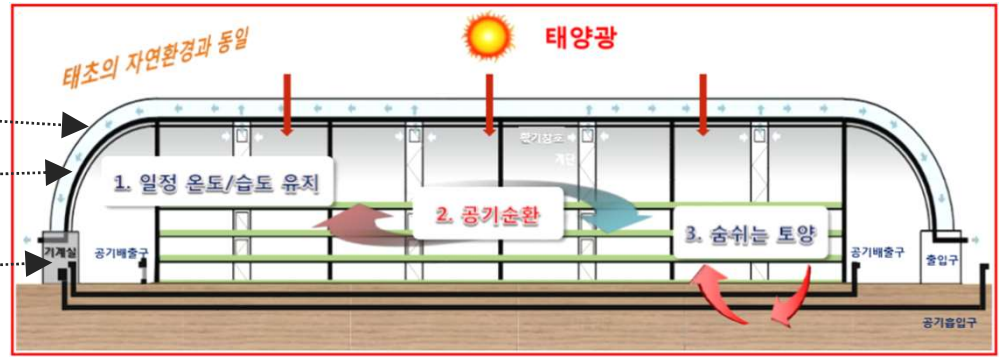
FOR GYM

FOR OUTDOOR EVENTS

FOR PLAY



AIR-DOME WALL STRUCTURE



2. MEDIA INTRODUCTION @ TV, YOU-TUBE

3. COMPARISON WITH OTHER' (Structure)

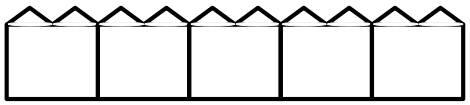
OUR PRODUCT	DOUBLE GREENHOUSE	GLASS GREENHOUSE
		
	It is made of double film inside and outside Pillars are installed, and there is no air pressure. As the outside air flows in directly Invasion of pests, weeds and pathogens is possible. Room temperature/humidity control is not possible.	It is made of glass and has good light transmittance. There are many structures inside, so there is shade. As a result, the actual amount of sunlight decreases. As the outside air flows in directly Invasion of pests, weeds and pathogens is possible. Room temperature/humidity can be adjusted Poor insulation, high heating and cooling costs.
It is made of double film inside and outside, but there is no pillar and the shape is maintained by air pressure. After removing pests, weeds, and pathogens, clean air with appropriate temperature & humidity is supplied to the room.		The temperature inside the glass greenhouse in summer is too high An aluminum screen blocks the sun to keep the temperature down. In some cases, cultivation in July or August may be abandoned if temperature control is not possible.

3. COMPARISON WITH OTHER' (Size)

W:4.5m x L:140m x H:6.5m

GLASS GREENHOUSE (660㎡)

6m x 8m x 5sets



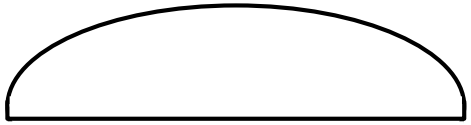
Work space

Imposible
(5ton truck)

W:40m x L:100m x H:8m

AIR-DOME (4000㎡)

10m x 40m x 1set



Work space

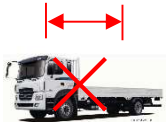
Posible
(5ton truck)

W:6.5m x L:100m x H:4m

GRRENGOUSE (660㎡)

4m x 6.5m x 6sets

Work space



Imposible
(5ton truck)

Frontal Comparison (Height-Width)

3. COMPARISON WITH OTHER' (Size)

W:4.5m x L:140m x H:6.5m

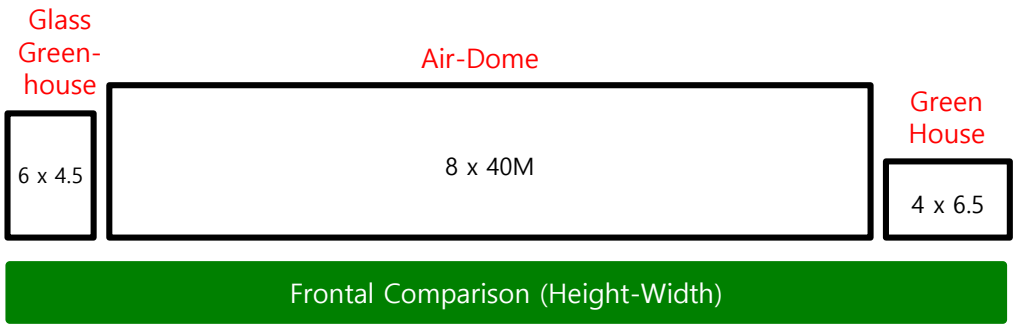
GLASS GREENHOUSE (660㎡)

W:40m x L:100m x H:8m

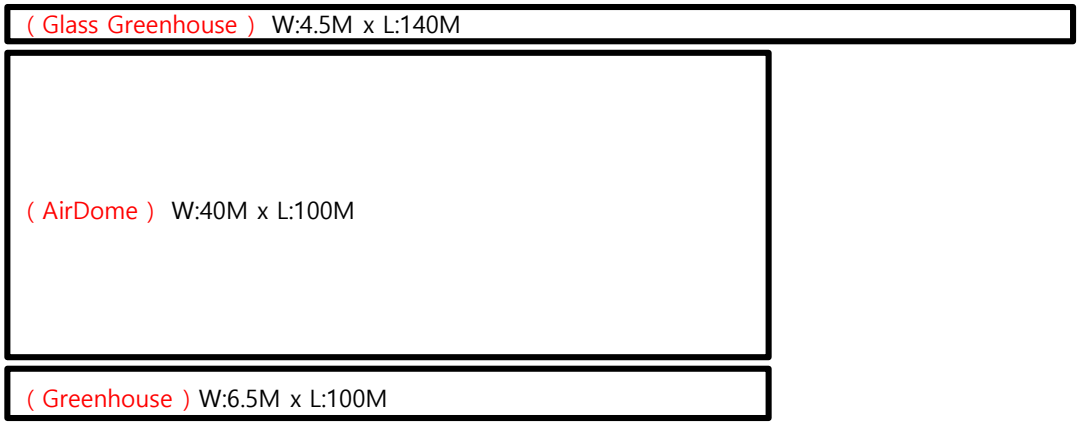
AIR-DOME (4000㎡)

W:6.5m x L:100m x H:4m

GRRENGOUSE (660㎡)



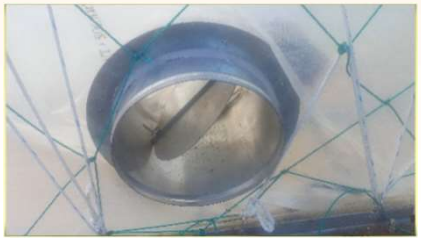
Frontal Comparison (Height-Width)



Plane Comparison

5. FACILITIES & EUIPMENTS

AIR CHAMBER
(Pest/weed removal)



Hot air outlet (ceiling)

Safety Net

Wall Aisle

Inside

geothermal plant

Heat
Pump

Aisle Air ducts

Air Supply

Outside air duct

Air Heating unit

Blower

Pressure control unit

Temp/Humid Control unit

6. PURPOSE OF MAJOR FAC&EQUIP

AIR-DOME

HEAT SOURCE EQUIPMENT

FUEL SUPPLY

AIR HANDLING UNITS

AIR CHAMBER

구 분	기능 및 용도
1) AIR-DOME	BASIC STRUCTURE
2) HEST SOURCE	ELECTRIC HEAT PUMP HEATING/COOLING UNITS
3) ENERGY	GEOTHERMAL / ELECTRIC WASTE TO ENERGY
4) AIR HANDLING UNIT	Pneumatic control to maintain the air dome structure. Temperature and humidity control inside the greenhouse
5) AIR CHAMBER	Blocking weeds, pests, pathogens, dust and preventing external contamination through the air
6) PRE-TREATMENT ROOM	Prevention of inflow of diseases/pests and control of entry and exit
7) IRRIGATION WATER FACILITY	Greenhouse internal water supply
8) EMERGENCY GENERATOR	Emergency power supply in case of power failure
9) CONTROL SYSTEM	Monitoring and control of crop growth status and environment inside the greenhouse

MONITORING UNIT

ACESS CONTROL DEVICE

UNDERGROUND WELL & W-TANK

WATER SUPPLY

EMERGENCY GENERATOR

7. BLOCK WEED & PESTS

Block weeds and pests.
Prevention of ingress of external pesticides.
clean air supply

Primary filter

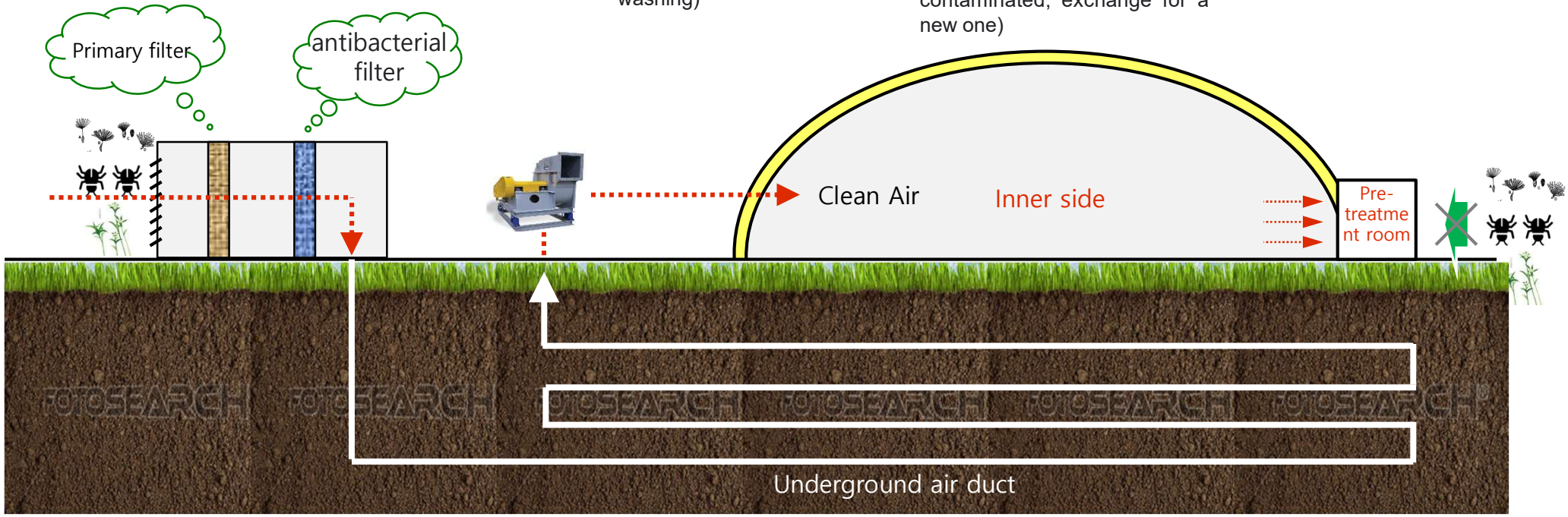
Remove pests, dust, and foreign substances that enter through the outside air. primary removal (If contaminated, use after washing)

Secondary filter

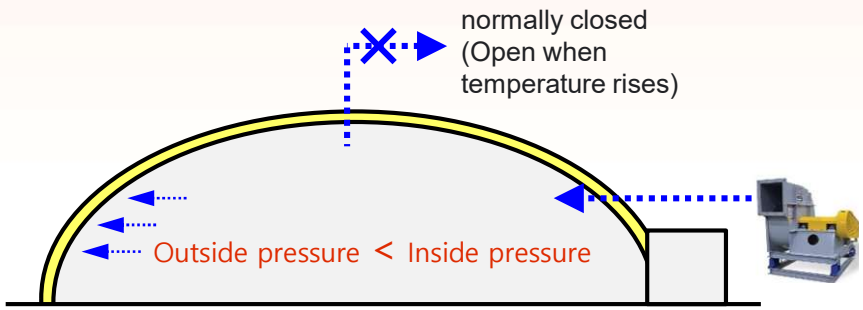
Removes small foreign substances that cannot be filtered out by the primary filter, Removes pathogens through antibacterial filter (If contaminated, exchange for a new one)

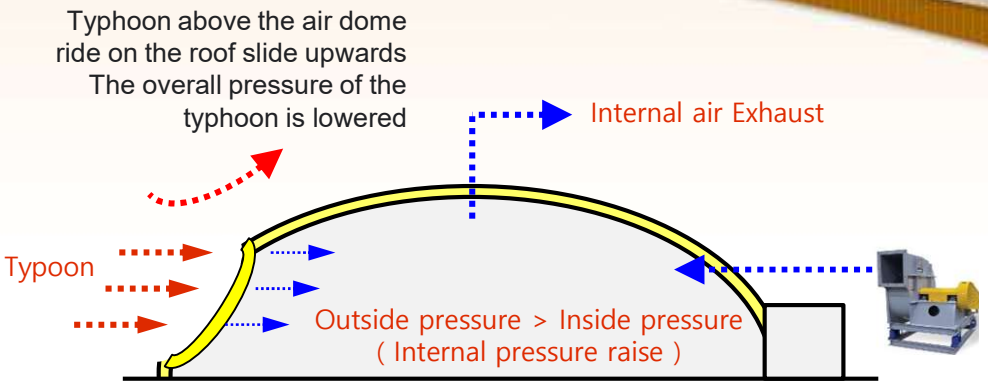
Pretreatment room

Air dome internal pressure higher than outside No outside air can penetrate. (No intrusion of foreign substances such as pests, weeds, dust, etc.)



8. TYPOON SAFETY





No fear of collapse

GLASS GREENHOUSE

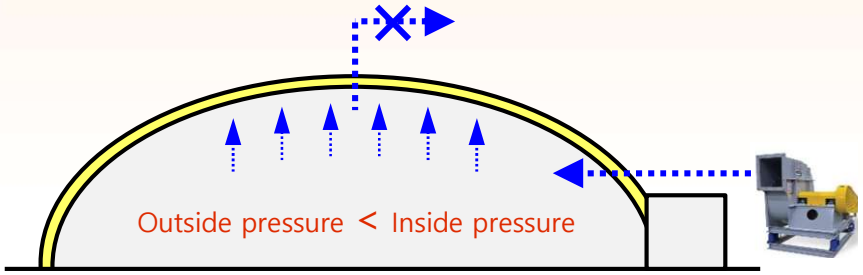
by steel structure Support external pressure and load

The wall is directly pressured by the typhoon

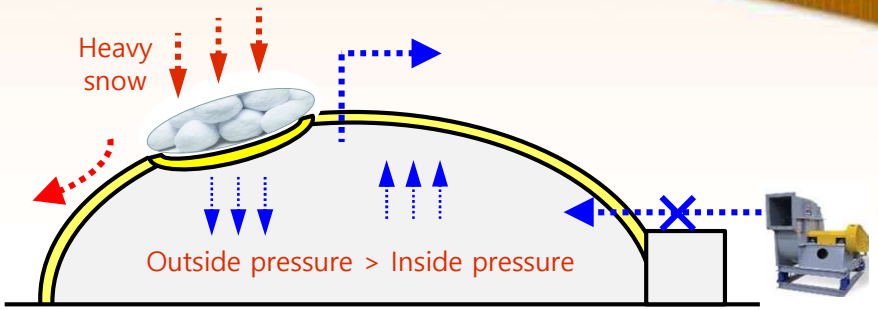
glass greenhouse structure If it cannot withstand the pressure of the typhoon Greenhouse destroyed or collapsed. capable of supporting external pressure and load Robust civil engineering work is required

AIR-DOME

9. HEAVY SNOW SAFETY

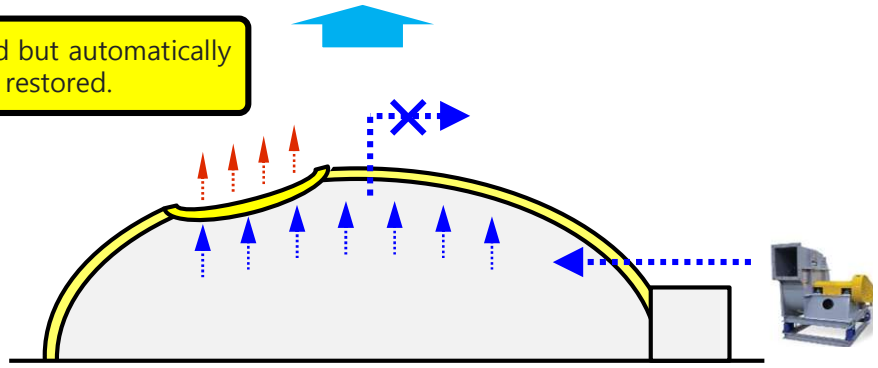


Normally, it is caused by the air pressure that is pushed up inside the greenhouse. keep the structure in balance



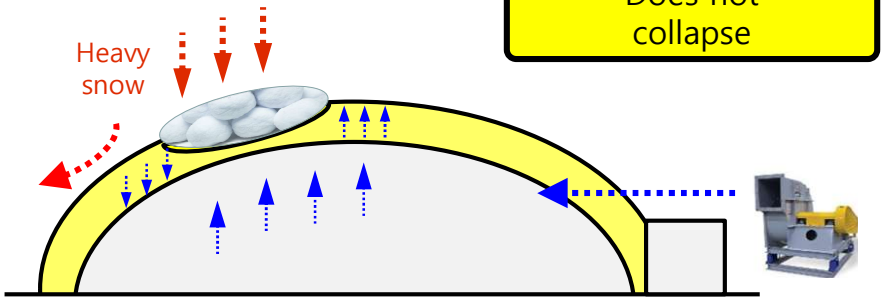
If the upper part of the air dome is lowered by more than 1M due to snow ☞ The ceilings of both the inner dome and the outer dome are lowered and deformation occurs in the interior space of the greenhouse. Compression of air inside the greenhouse → Increase in greenhouse pressure → Release air → Maintain equilibrium

Deformed but automatically restored.



When the accumulated snow disappears The part deformed by the air pressure pushing up inside the greenhouse is automatically restored.

Does not collapse

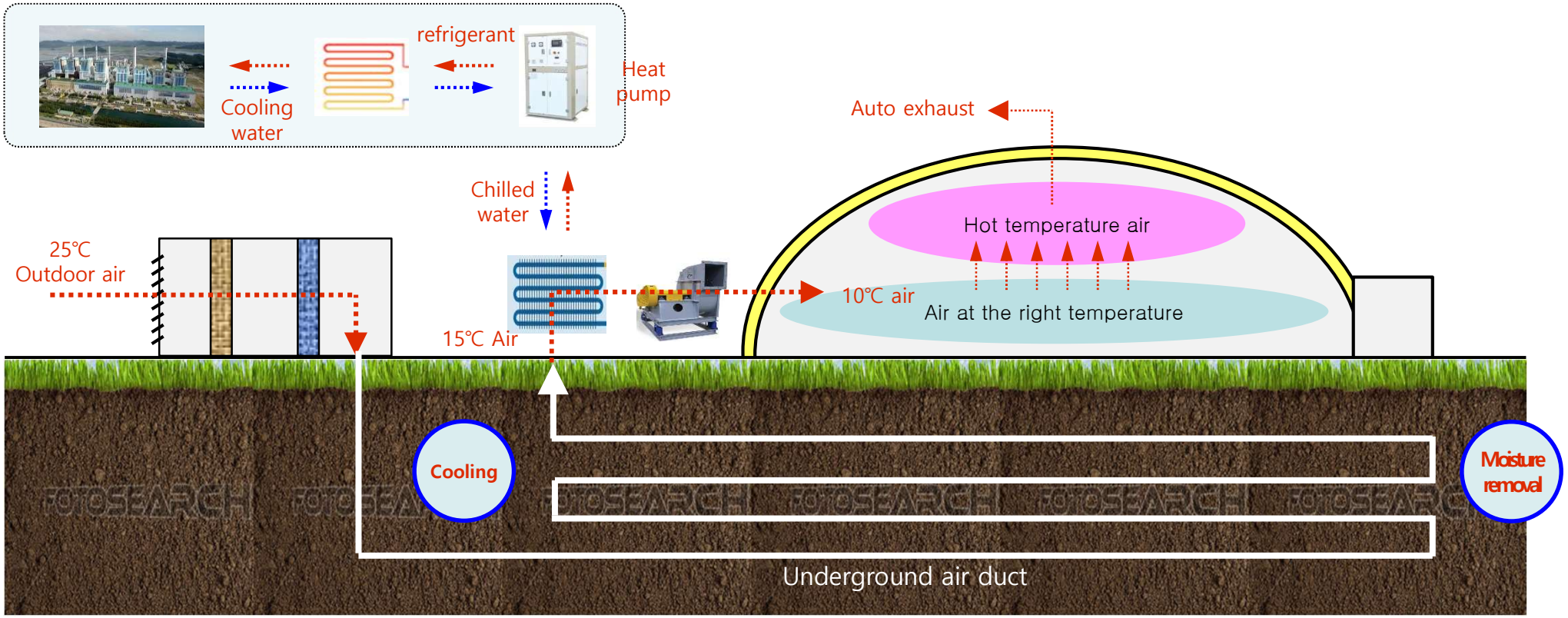


When the upper part of the air dome sinks less than 1m ☞ The ceiling of the outer dome is lowered, but the inner dome is not deformed. The air inside the outer dome is compressed → the pressure outside the inner dome is increased → the air is discharged → the equilibrium is maintained

10. REDUCTION OF COOLING COST

HEAT PUMP POWER SAVING (67%)

Outdoor Air 25℃ → Geo-duct 15℃ → Supply air 10℃ → Inside 26℃

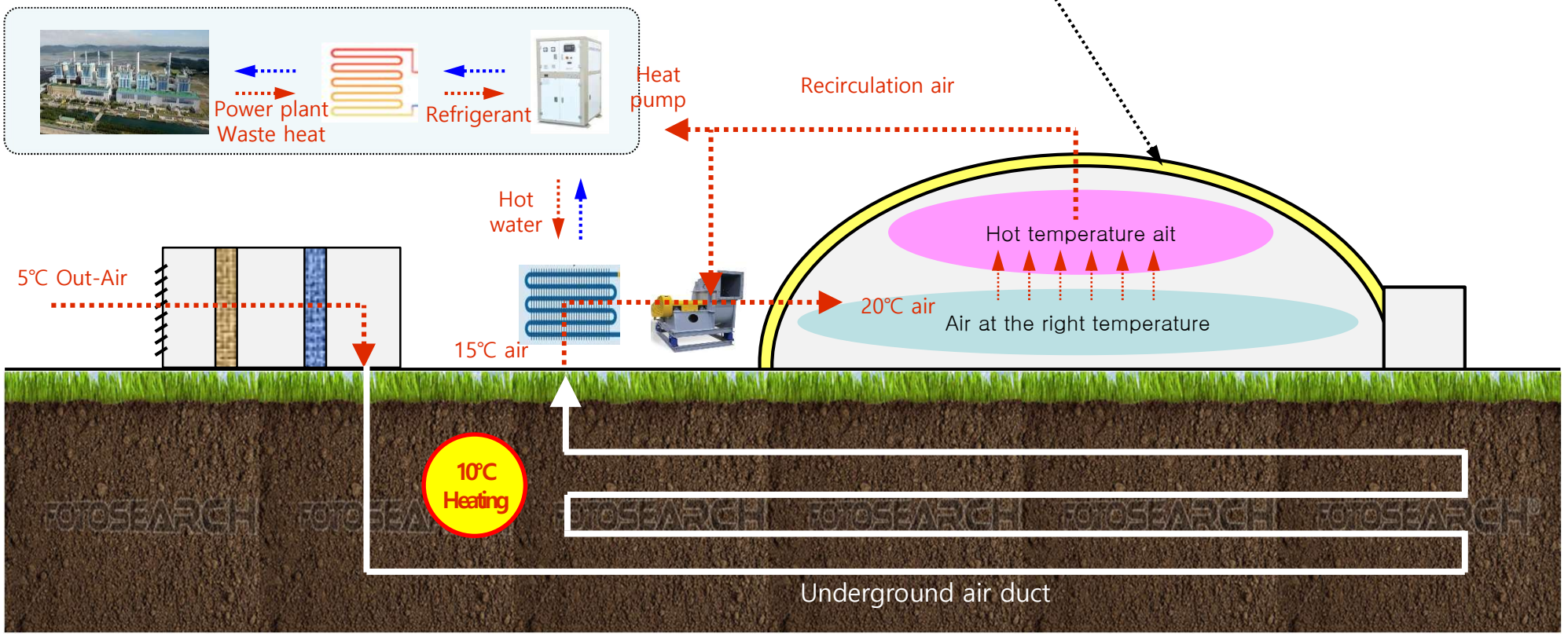


The air passing through the underground pipe Cooling by geothermal heat removes some of the moisture

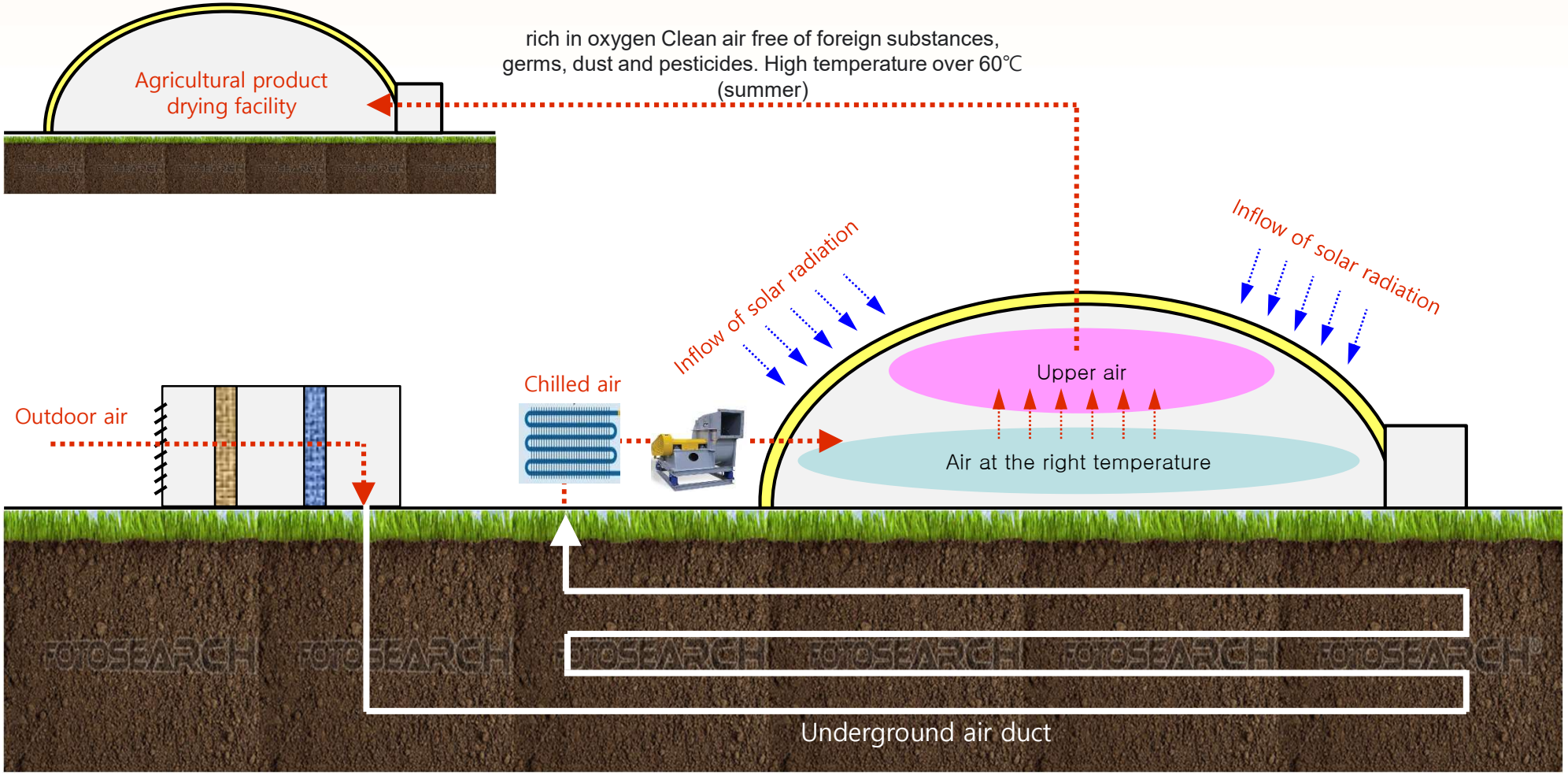
11. REDUCTION OF HEATING COST

HP POWER 67% SAVING + AIR INSULATION EFFECT (20~30%) + RE-CIRCULLATION AIR

OD Air 5℃ → Underground 15℃ → Sup Air 25℃ → AIR INSULATION EFFECT → Inside 20℃



12. HIGH TEMP EXHAUST AIR REUSE



13. ADVANTAGE OF AIRDOME AGRICULTURE

ECONOMICS

① A much more effective and productive facility is possible at a cost of about 70% of the glass greenhouse
② It is possible to cultivate a very large facility, so it is possible to improve workability and reduce facility cost through enlargement
③ Double structure passage and air wall insulation to prevent leakage or inflow of internal heat to save energy
④ Energy saving is possible with pre-cooling/preheating of supply air using geothermal heat and high-temperature air above the dome

STRUCTURE

① There is no steel structure inside the dome, and there is no need for complicated foundation construction, so construction is simple
② The width of the dome is 30~50m and the height is about 8m
③ It is very safe even in very large typhoons and heavy snow by controlling the air pressure. No damage from disaster
④ Easy to repair in case of damage, semi-permanent use is possible by replacing only the vinyl when the service life is over

GROWING ENVIRONMENT

① As outside air is supplied after being filtered by a filter, there is no intrusion of pests or weeds, and eco-friendly organic farming that does not use herbicides and pesticides is possible.
② Due to low energy cost, the best growth conditions are possible by maintaining constant temperature/humidity 365 days a year.
③ The amount of oxygen supplied to the soil surface is increased by the air pressure that is forcibly injected into the dome, which alleviates soil hardening and increases aerobic microorganisms to improve root establishment. It has the effect of suppressing pests and pests, alleviating salinity disorders, and promoting the growth of crops.
④ There is no iron structure inside the facility, so there is no decrease in the amount of sunlight or the amount of light due to the shade.
⑤ With optimum temperature/humidity and clean air supply, the indoor working environment is pleasant and very hygienic.

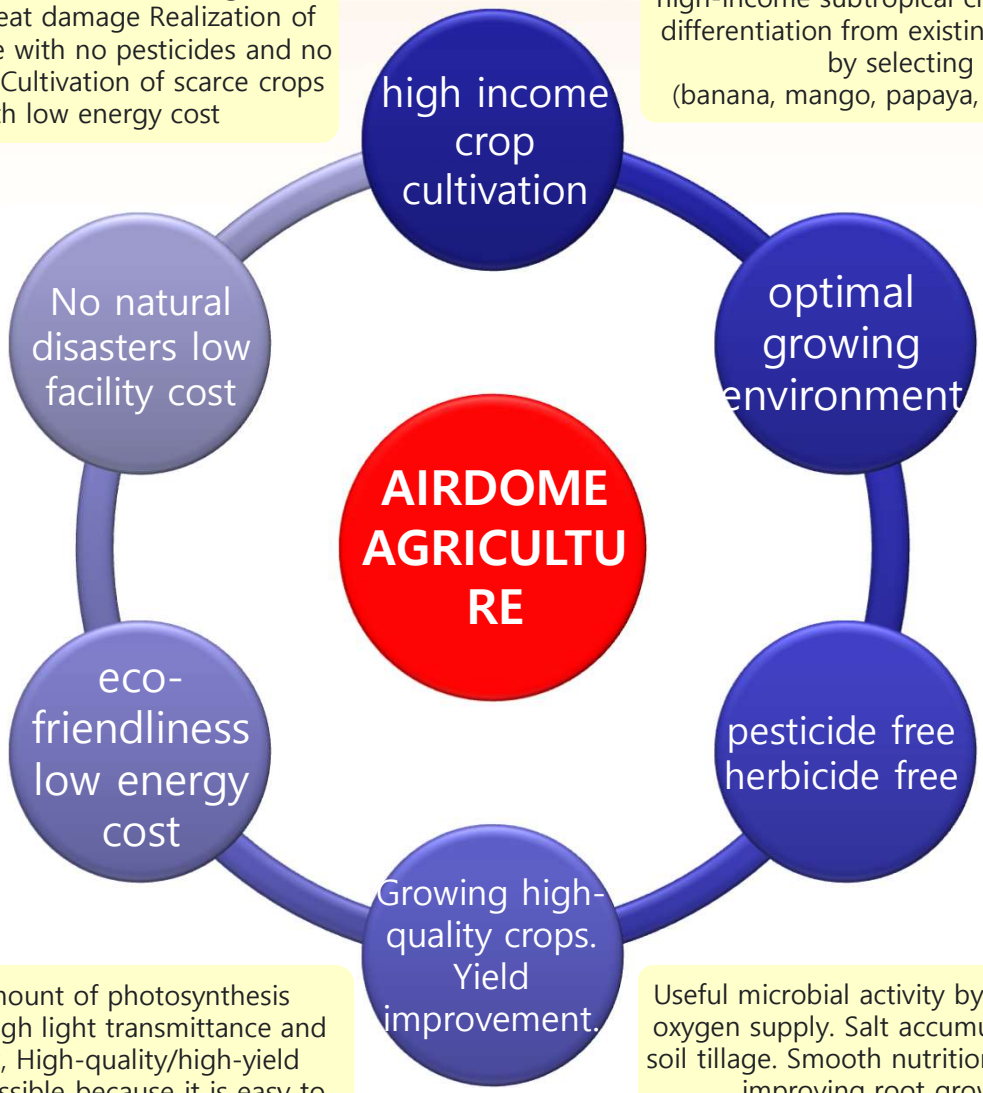
14. EXPECTED EFFECTS

Increase production, improve quality	It is possible to create an optimal growth environment by introducing smart farming methods. Increase production and improve quality
Increase the diversity of cultivated crops	Four-season farming is possible without being affected by soil or climatic conditions, and it is possible to grow tropical and subtropical high-income crops by reducing energy costs
Reduce labor, increase productivity	Greenhouse enlargement and automation are possible, so it can be done with a small number of people and effort. High-tech large-scale farming is possible and productivity is dramatically improved
Reduce Energy cost	It is possible to effectively use solar radiation and maximize energy saving by air insulation. Significant energy cost savings possible
eco-friendly agriculture	It is possible to minimize the generation of agricultural waste due to frequent plastic replacement, By effectively utilizing solar and geothermal heat and managing insulation materials appropriately, it can reduce petroleum energy consumption and contribute to greenhouse gas reduction.

15. GOALS AND DIFFERANTIATION

No damage from wind damage/cold damage/heat damage Realization of high income with no pesticides and no herbicides. Cultivation of scarce crops with low energy cost

high-income subtropical crops Securing differentiation from existing agriculture by selecting
(banana, mango, papaya, coffee, etc.)



There is no damage from typhoons and heavy snow, and it is economical because of its long durability. Easy to install and low cost

A hygienic and comfortable growing environment that can control constant temperature/humidity throughout the year at a low cost

Less environmental waste, such as plastic waste, pesticides, and herbicides, and low energy costs due to thermal insulation and the use of geothermal heat.

Eco-friendly agriculture is possible by blocking the intrusion of pests, weeds, and pathogenic viruses.

The actual amount of photosynthesis increases with high light transmittance and scattered light, High-quality/high-yield agriculture is possible because it is easy to optimize growth temperature and humidity.

Useful microbial activity by increasing oxygen supply. Salt accumulation and soil tillage. Smooth nutrition supply by improving root growth.

16. GOVERNMENT AGENCY VERIFICATION

National Horticultural
Special Science Academy






16. GOVERNMENT AGENCY VERIFICATION

Tropical Fruit Growth test

에어돔 하우스에서의 열대과일 생육 테스트

(산광형 직조필름 시험)

1. 시험포:국립원예특작과학원 시설원예연구소
2. 시험작물: 바나나,파파야,커피
3. 시험일시:2017년10월01일~2018년04월25일
4. 적용필름:유니온화학 산광형 직조필름
5. 결 과 : 생육전후의 사진

초기 정식 사진

5개월후 사진 (개화후 열매 성장시작)

18. WINTER AIR-DOME TEMPERATURE

1월2일오후10시23분(1).jpg

1월2일오후10시23분(2).jpg

1월2일오후10시23분(3).jpg

1월3일오전4시20분(1).jpg

1월3일오전4시20분(2).jpg

1월3일오전4시20분(3).jpg

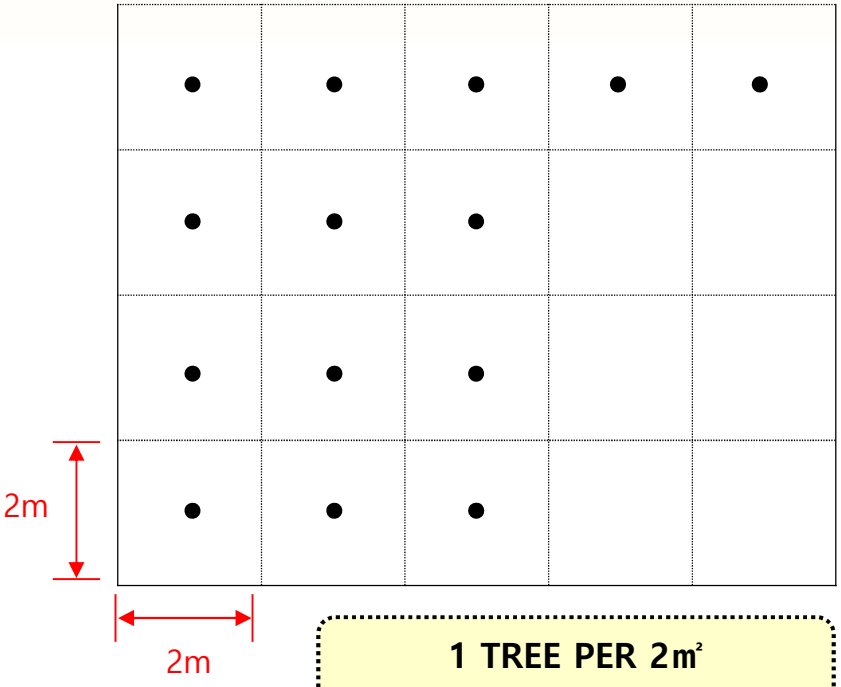
1월3일오전11시42분(1).jpg

1월3일오전11시42분(2).jpg

DEMO CULTIVATION

1. BANANA PLANTING

TRADITIONAL PLANTINGS	AIRDOME PLANTING

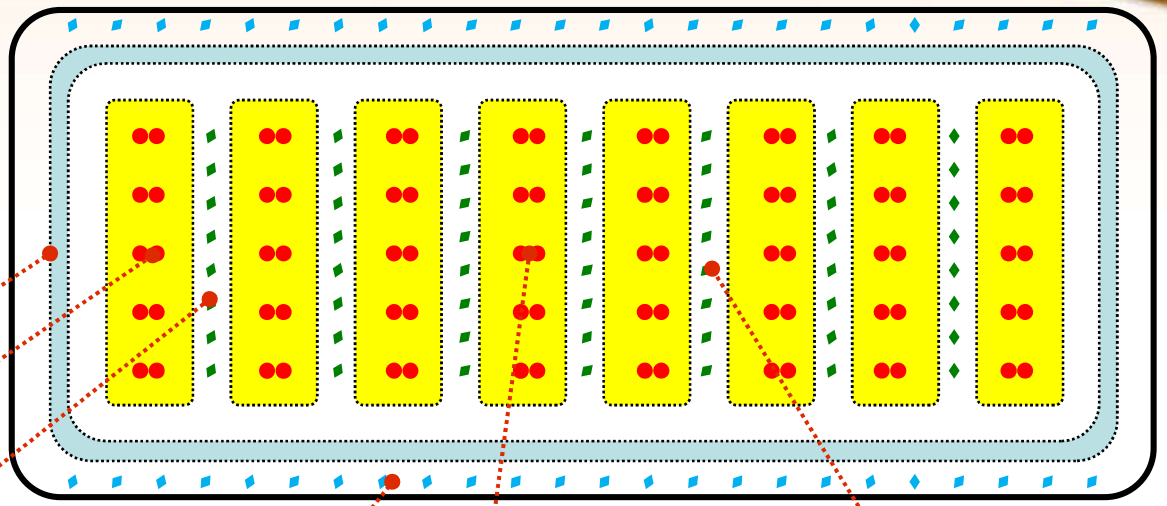


1 TREE PER 2㎡
(2500 TREES PER 1ha)
Growth temperature 26℃

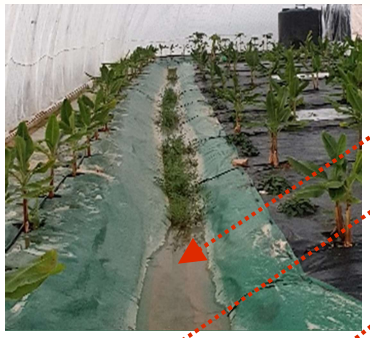
2~4 TREES PER 2㎡
(5000~8000 TREES PER 1ha)
Growth temperature min 5℃

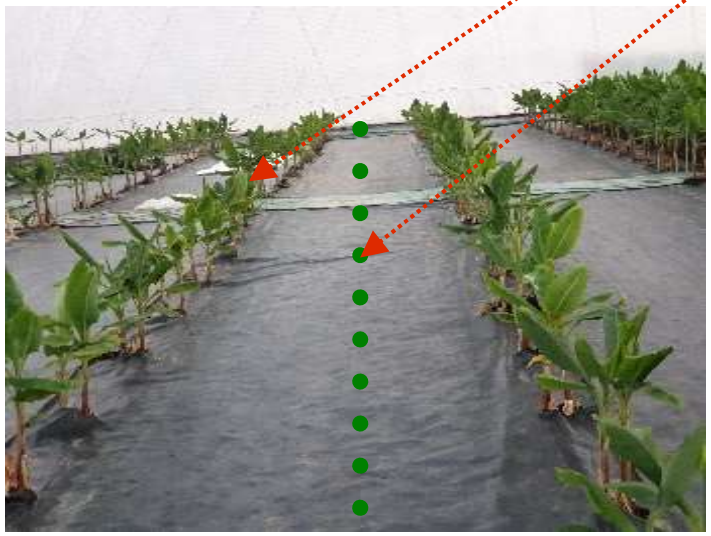
2. USE OF INTERNAL SPACE

Bananas, papayas, coffee trees, etc. are grown according to the growing space of the crop.
Mixed cultivation to maximize space utilization
Eco-space can be created.

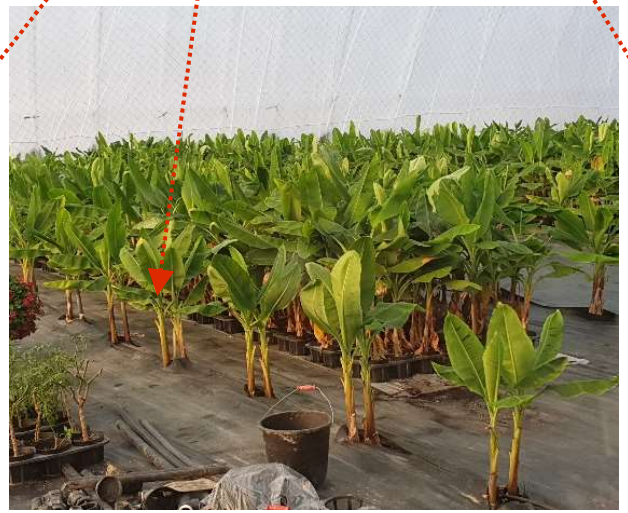


Waterways and passageways

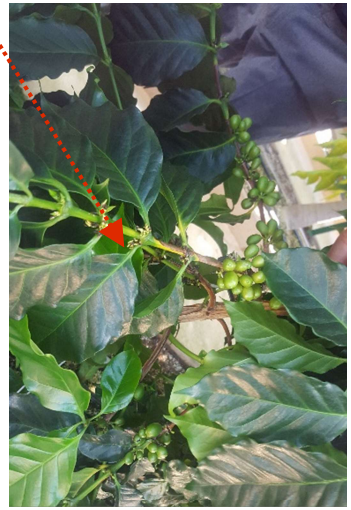




PAPAYAS



BANANA



COFFEE

3. DEMONSTRATION CULTIVATION (2018~2022)









4. COMMERCIALITY OF AIRDOME BANANA

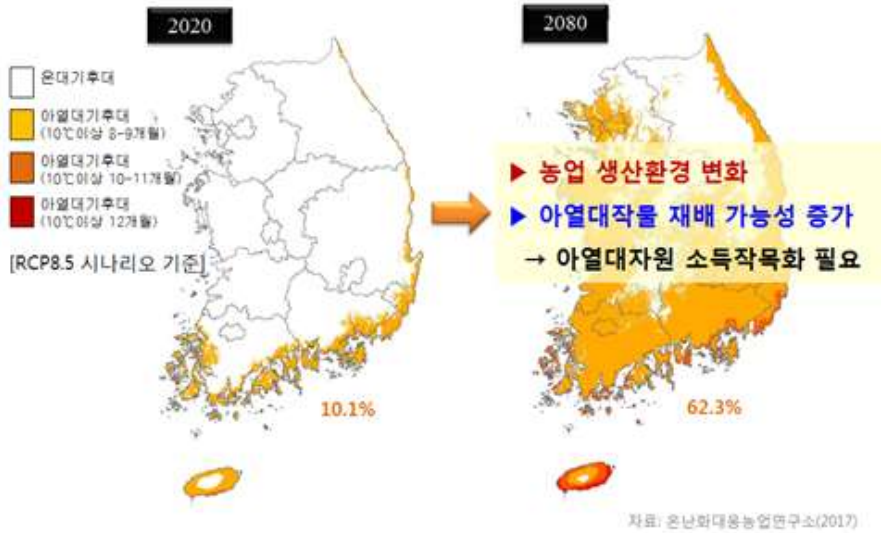
IMPORTED BANANA VS AIRDOME BANANA

ITEM목	IMPORTED	AIRDOME
FULL RIPENESS	X	○
POST-AGING	○	X
POINT OF SALES AFTER HARVEST	40 days	5 days
Quarantine and steam (disinfection)	○	X
Pesticide Safety	Unreliable	Reliable
FRESHNESS	△	○
TASTE, SUGAR CONTENT	△	○
SCENT, STORABILITY	Bad	Good
RETAIL PRICE PER KG	2,200	10,000

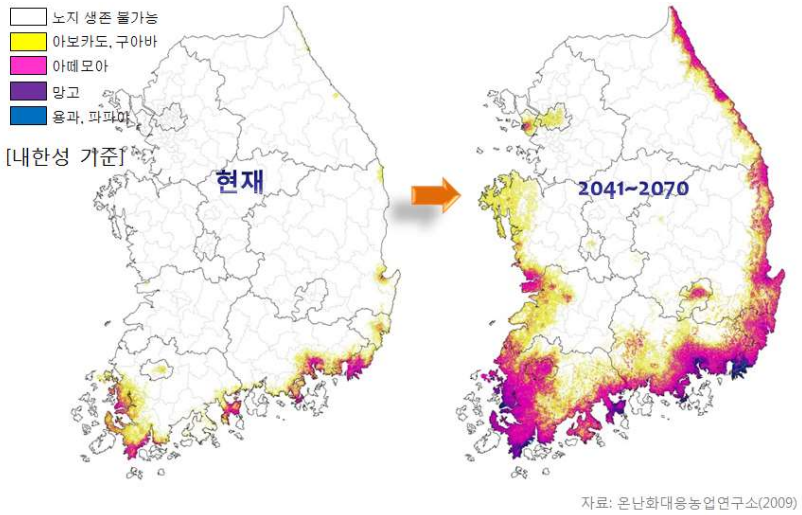
SUBTROPICAL CROP AGRICULTURE

1. CLIMATE CHANGES

Expansion of subtropical climate zone



Subtropical crop growing area



Subtropical crop Area (KOREA)

2020	2060	2080
10.1%	26.6%	62.3%

Subtropical crop cultivation areas are currently limited to Jeju and some southern coastal areas, but after 2040, Expanded to the central, eastern and western coasts

2. SOCIAL ENVIRONMENT CHANGE

FTA로 외국산 농산물 수입이 자유화

FTA 협정에 의해
농수산물 시장이 개방되면서
값 싼 열대지방 작물이 대규모로
국내 시장에 진입

세계화로 기호 식품의 변화

해외 여행의 증가로
열대 작물 접촉이 많아지고
젊은 층의 수입 과일 선호도가 높아짐.
웰빙에 대한 관심이 폭발하면서
맛 좋고 기능성 있는
수입 과일과 야채 소비가 증가

다문화 가정 및 외국인 근로자 증가

2020년 다문화 가정 인구 수가
100만명 이상으로 예상.
외국인 근로자 증가로
외국산 야채와 과일 소비가 증가

다양한 가공 식품 개발로 수입 농수산물 수요가 증가

사회 환경 변화로
다양한 가공식품 수요가 증가하면서
외국산 과일과 야채의 수요도 증가

3. 정부의 아열대 작물 농업 정책

농촌진흥청	보 도 자 료	작성과	온난화대응농업연구소
	2017년 8월 31일(목)부터 보도될 수 있도록 협조 부탁드립니다.	담당자	소장 서형호 농업연구관 김성철
		연락처	064-741-2560
		제공일	2017. 8. 31(총 20장)

미래 먹거리, '아열대작물'로 대비한다

- 기후변화 대응 아열대작물 50종 도입20종 선발… 재배기술 개발보급 -

□ **지구온난화가 진행**됨에 따라 **미래 새로운 소득 작물로 아열대작물이 뜨고 있다.**

○ 제주도에서 30년 가까이 농사를 짓던 김순일 씨는 2015년 아열대작물인 파파야와 바나나 재배로 작목을 바꿨다. 친환경으로 재배하기 쉽고 노동력도 적게 드는 이유에서다.

기후 온난화에 따라 아열대 재배지가 확장되면서
아열대 작물 재배농가가 증가하면서
적극적인 농업 정책이 필요해 짐.
2020년 재배면적이 1000ha 이상으로 증가 예상

기후 온난화에 따라 미래형 고소득 작물로
아열대 작물이 부상

2008년 이후 50종의 아열대 작물을 도입하여
국내 적합 작물 20종을 선발하고
이중 **13종에 대해 재배기술을 개발하여 보급**
과일 : 패션프루프, 망고 등 5종
채소 : 여주, 롱빈, 아티쵸크 등 기능성 작물 8종

농가 소득 향상과 수요 촉진을 위해
아열대 작물의 기능 성분을 분석하고
한식 레시피를 개발하여 보급

4. SUBTROPICAL FRUIT IMPORT/CULTIVATION

대분류	중분류	재배면적(ha)	생산량(톤)
Fruit	패션프루트	44.4	111
〃	망고	32.5	398
〃	구아바	10.9	3
〃	용과	5.1	80
〃	파파야	4.6	230
〃	아보카도	2.9	0
〃	바나나	1.4	31
〃	파인애플	0.5	2
〃	아떼모야	0.1	2
채소/특용	강황(울금)	189	2,835
채소류	여주(쓴오이)	115.6	4,162
채소류	삼채	14.7	117.6
채소류	얌빈	2.9	72.5
채소류	공심채	1.7	85
채소류	오크라	1.3	650
채소/특용	사탕무	1	1.3
계	**16작목**	**428.6**	**8,780.4**

YEAR	AMOUNT	BANANA	PINEAPPLE	MANGO	AVOCADO	FROZEN FRUIT	OTHERS
1995	145,216	121,538	23,644	2	32	-	-
2002	233,739	184,212	31,954	637	117	16,819	2,836
2012	473,183	367,960	73,131	2839	534	28,719	7,053
2013	428,673	313,604	75,917	6154	722	32,276	6,580
2014	482,730	359,124	75,419	10599	1,097	36,491	8,377
2015	489,414	363,479	68,373	13469	1,515	42,578	8,656
2016	493,151	364,599	77,375	11346	2,915	36,916	9,048

SUBTROPICAL FRUIT CULTIVATION AREA IN KOREA

2017 (EXCLUDING KIWI) : 428ha, (KIWI:1300ha)

2017 : 8780ton

Passion Fruit > Mango > Guava > Dragon fruit > Papaya > Avocado > Banana

(44.4ha) (32.5) (10.9) (5.1) (4.6) (2.9) (1.4)

강황 > 여주 > 삼채 > 얌빈 > 공심채 > 오크라

(189ha) (115) (14.7) (2.9) (1.7) (1.3)

5. SUBTROPICAL FRUIT MARKET SIZE

YEAR	AMOUNT	BANANA	PINE APPLE	MANGO	AVOCADO	FROZEN FRUIT	OTHERS
1995	58,730	49,512	9,042	15	161	-	-
2002	104,516	78,211	12,016	1,603	497	12,189	2,286
2012	391,684	249,920	55,630	12,681	2,235	71,218	9,861
2013	421,735	253,202	60,996	24,200	3,092	80,245	10,311
2014	521,406	321,111	62,215	43,080	4,870	90,130	15,217
2015	543,033	317,116	56,482	53,211	6,874	109,350	14,410
2016	545,329	328,366	71,893	45,937	11,885	87,248	15,577

SUBTROPICAL FRUIT MARKET SIZE

2016' TOTAL IMPORTS : 54.5M USD
2016' BANANA IMPORTS : 32.8M USD
BANANA SHARE : 60.4%

Keep on asking,
and you will receive what you ask for.
Keep on seeking,
and you will find.

Thank You!

AIRDOME PLUS / GC. JEONG
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