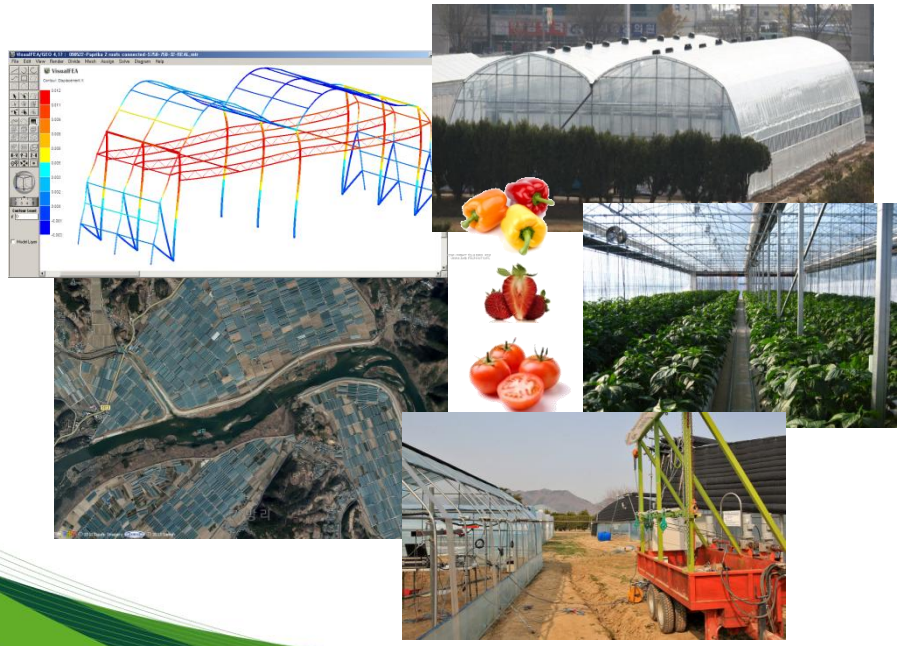
3rd RDA-EMBRAPA Workshop

RURAL DEVELOPMENT ADMINISTRATION
NATIONAL INSTITUTE OF HORTICULTURAL AND HERBAL SCIENCE

Greenhouse Design and Management



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Contents

- **Greenhouse area(ha) in the world***

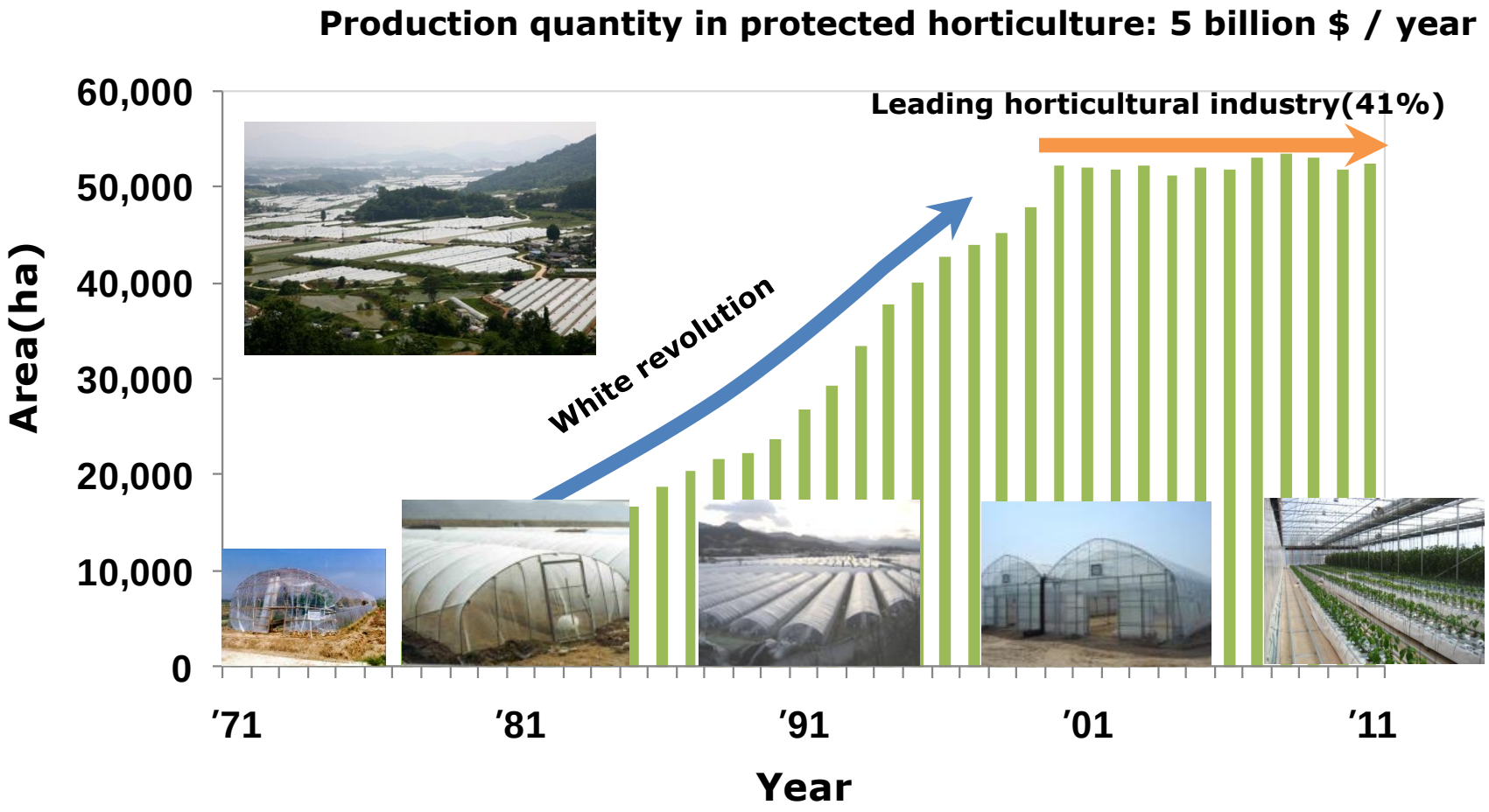
COUNTRY	AREA(ha)
China(2010)	2,760,000
Korea(2011)**	52,393
Spain(2005)	52,170
Japan(2011)	49,049
Turkey(2007)	33,515
Italy(2005)	26,500
Mexico(2010)	11,759
Netherlands(2007)	10,370


[film-plastic clad house]


[glasshouse]

* Dr. Murat Kacira, Univ. of Arizona(2012) / ** mifaff.go.kr(2012)

Change of greenhouse area(ha) in Korea*



* mifaff.go.kr(2012)

Greenhouse styles in Korea*

Structural type \ Covering material	Plastic film(99.3%)	Glass(0.6%)
Free standing	**42,350 ha(86.1%)**	2 ha
Gutter-connected	5,577 ha	272 ha
Rain shelter, Tunnel	1,248 ha	

Free standing type

Gutter-connected type

*** mifaff.go.kr(2012), for vegetables**

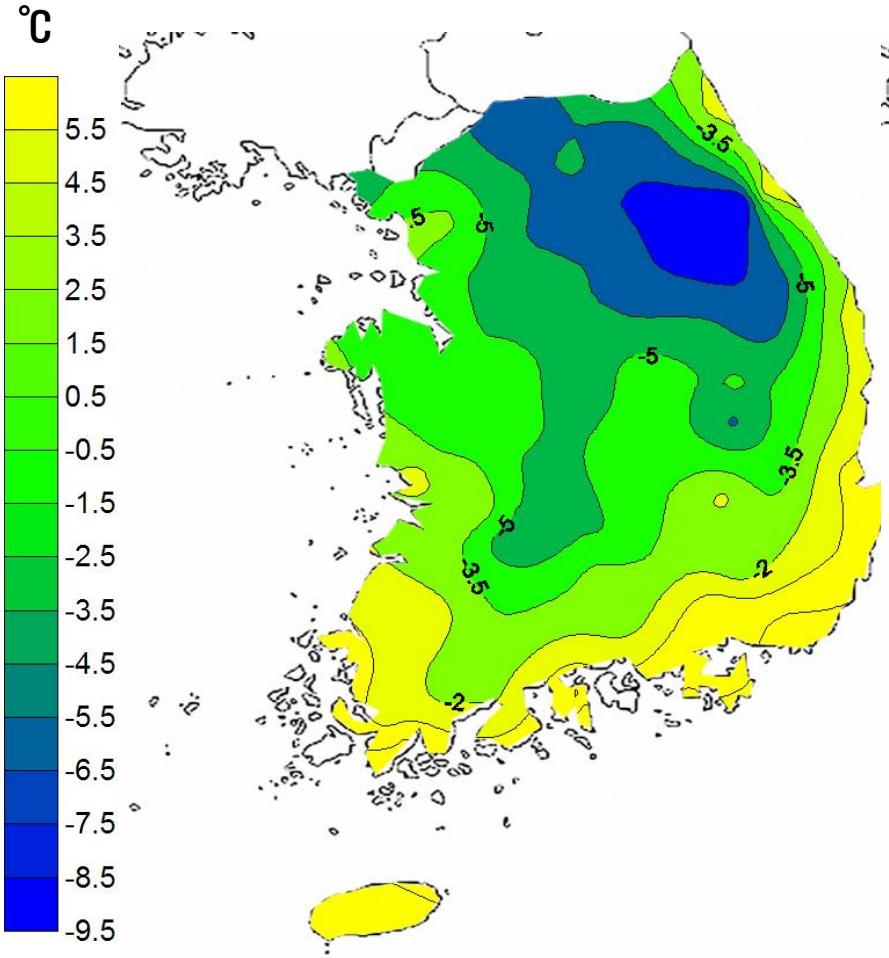
Cultivation area and production of main crops*

	Total	Watermelon	Strawberry	Tomato	Green pepper	Paprika
Cultivation area (ha)	68,610	12,995	5,681	5,850	4,814	429
Production (ton)	2,808,381	529,035	169,243	368,224	185,147	43,160
Production per unit area(kg/m^2)	**4.1**	**4.1**	**3.0**	**6.3**	**3.8**	**10.1**

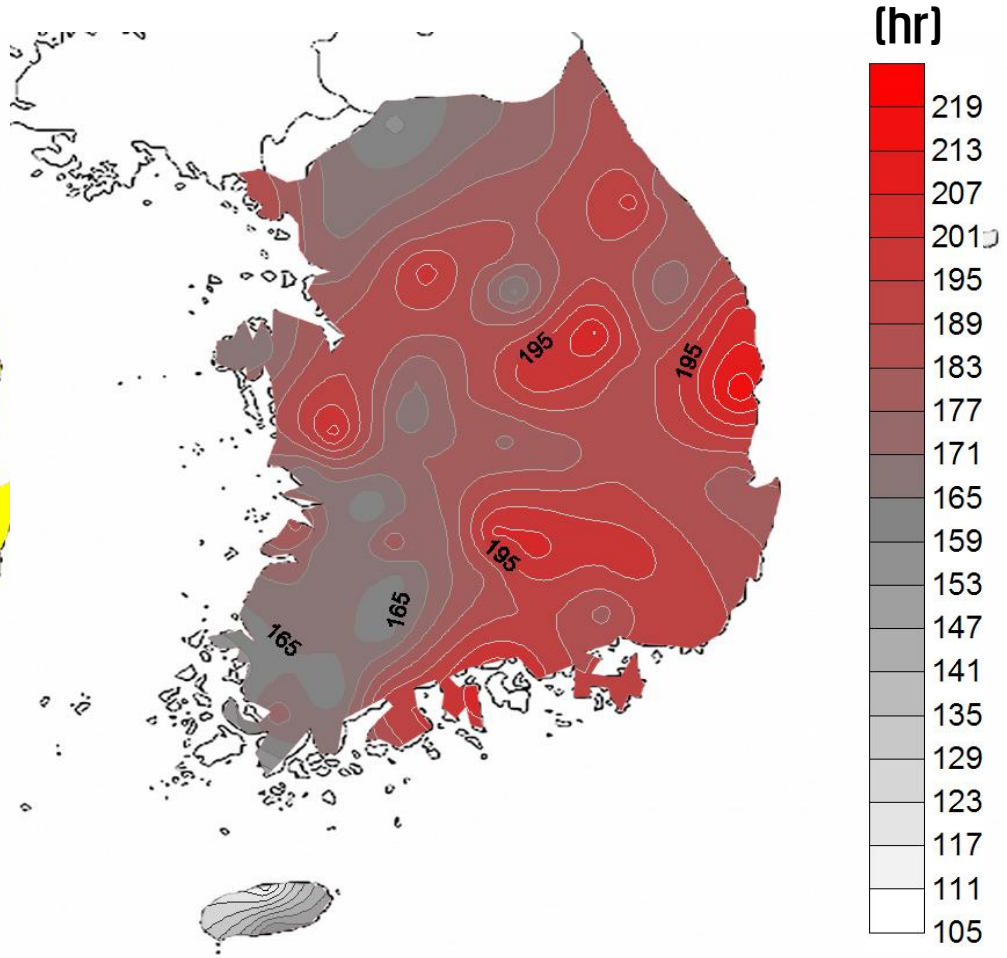
*** mifaff.go.kr(2012), protected cultivation vegetables**

Climate conditions*

✓ Average minimum temperature

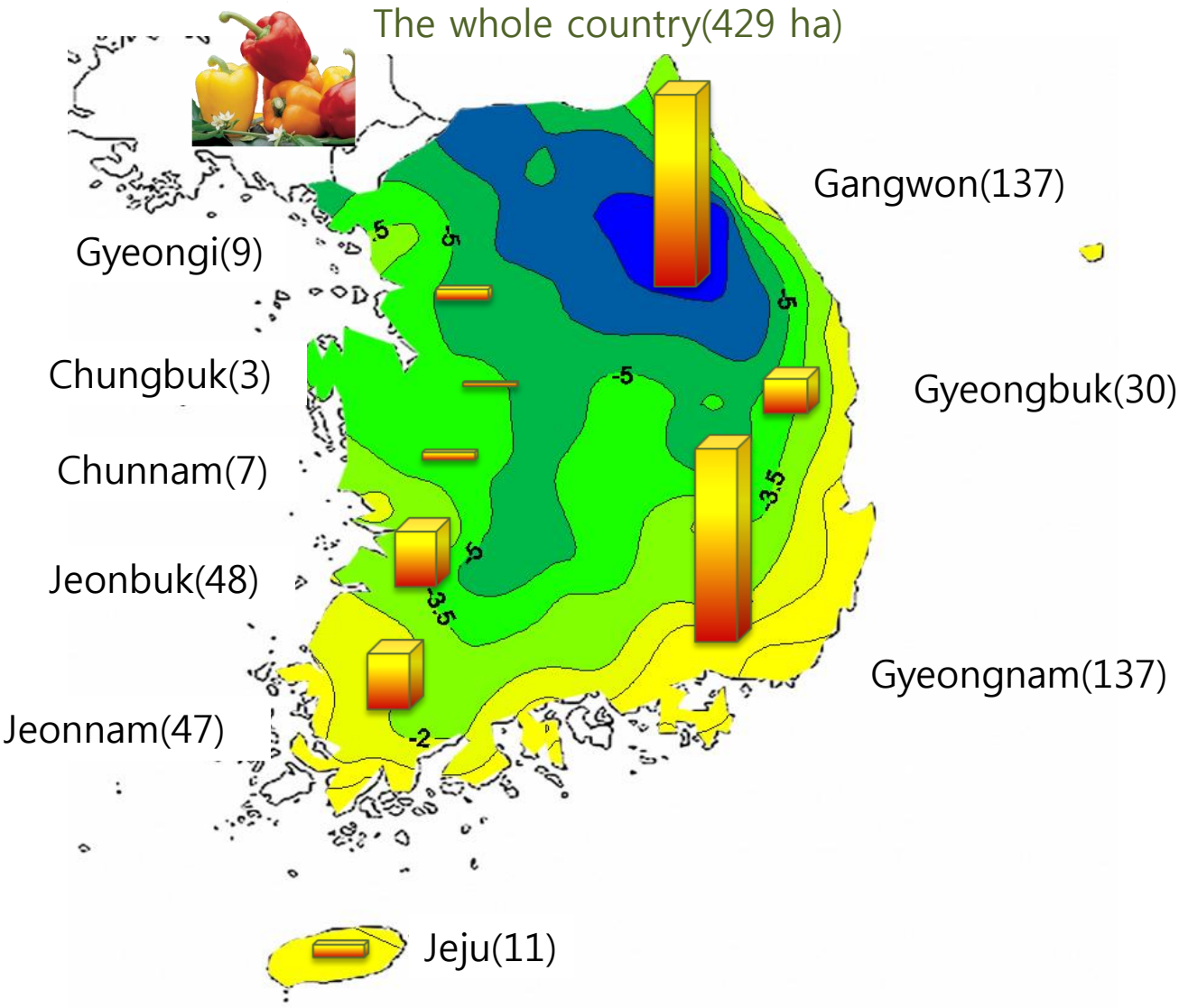


✓ Average sunshine hours per month



*** kma.go.kr, average values from December to March in common year**

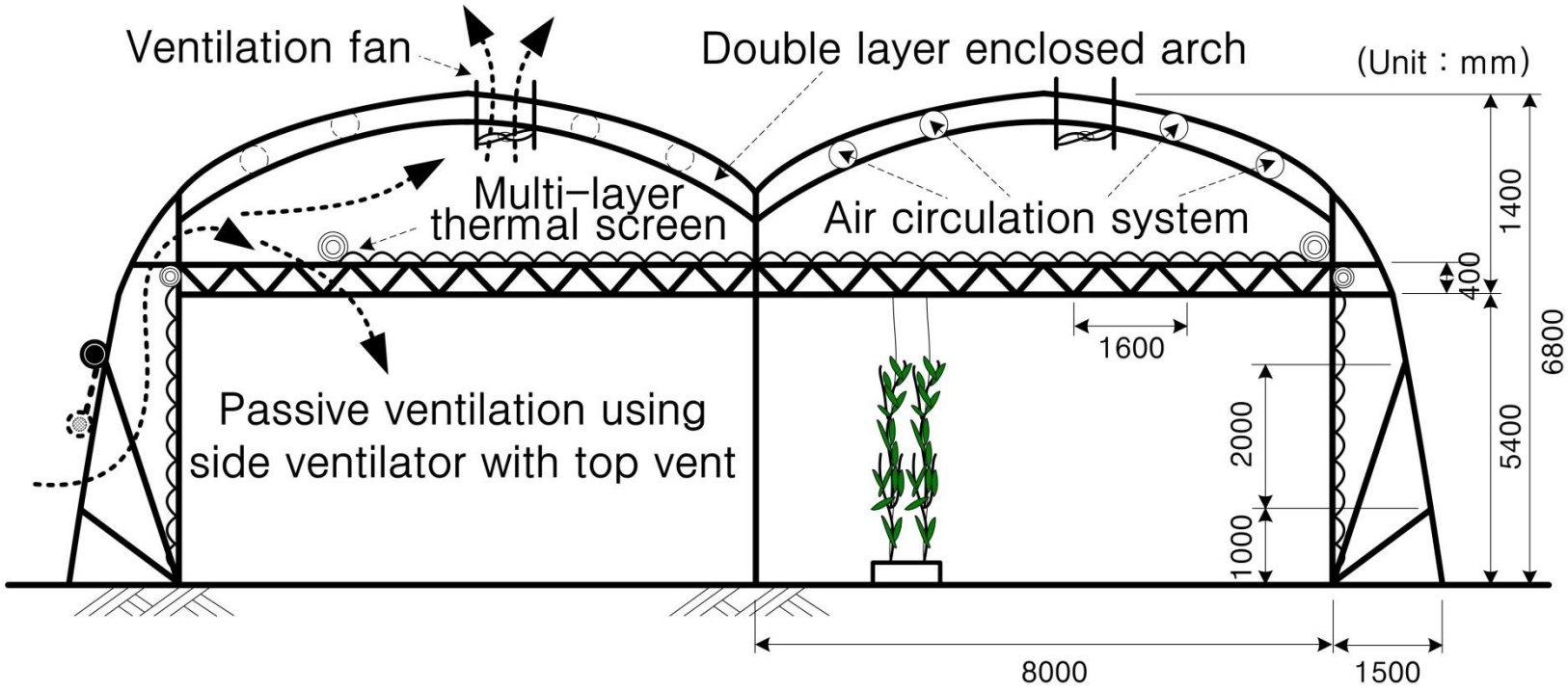
Cultivation situation of paprika in Korea



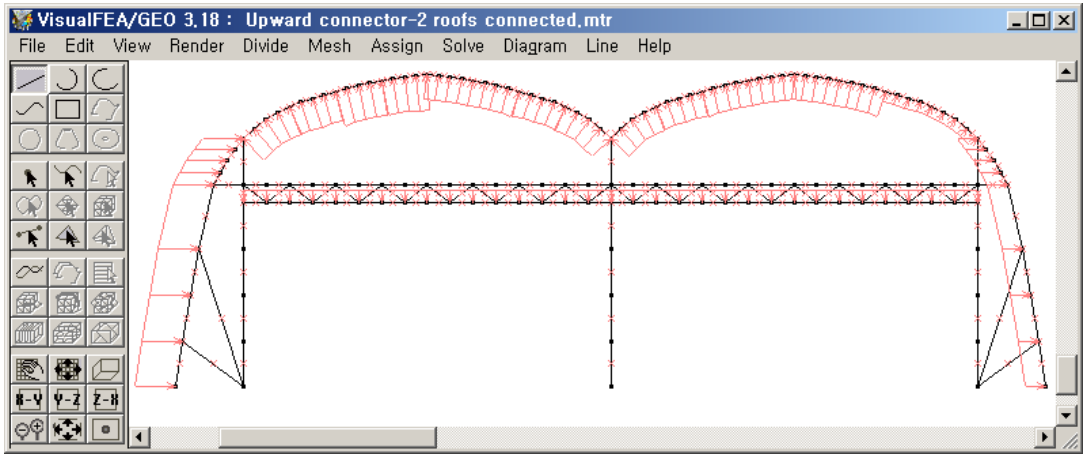
- **Design of greenhouse**

  - ✓ **Questionnaire study**
    - **style, height, width, energy consumption, …**
  - ✓ **Structural analysis for safety**
    - **wind, snow, equipments, crops, self weight, …**
  - ✓ **Field applicability evaluation**
    - **cultivation**
    - **structural safety**

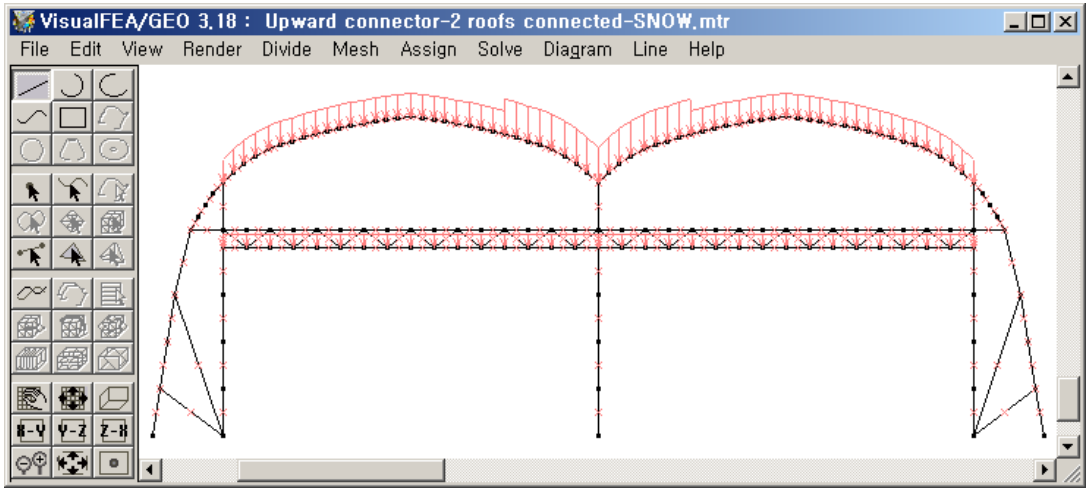
- **Design of greenhouse for paprika cultivation: *Sketch***



- Design of greenhouse for paprika cultivation: ***Structural analysis***

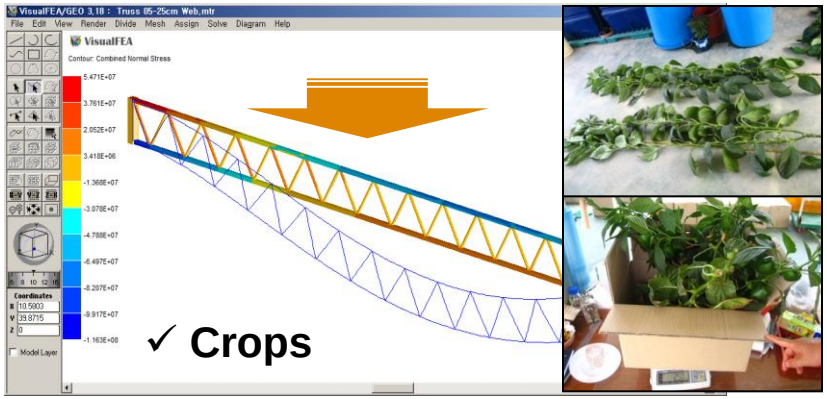


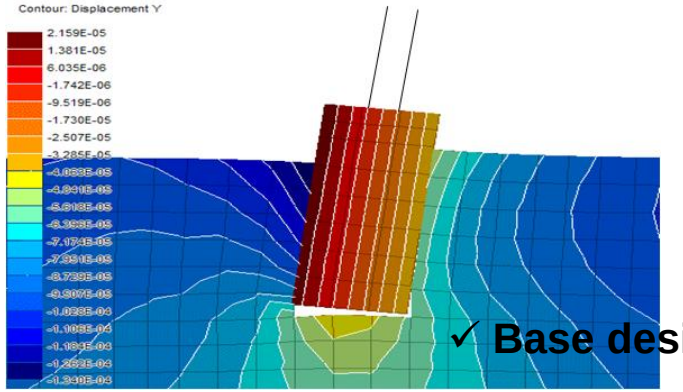
✓ **Wind**

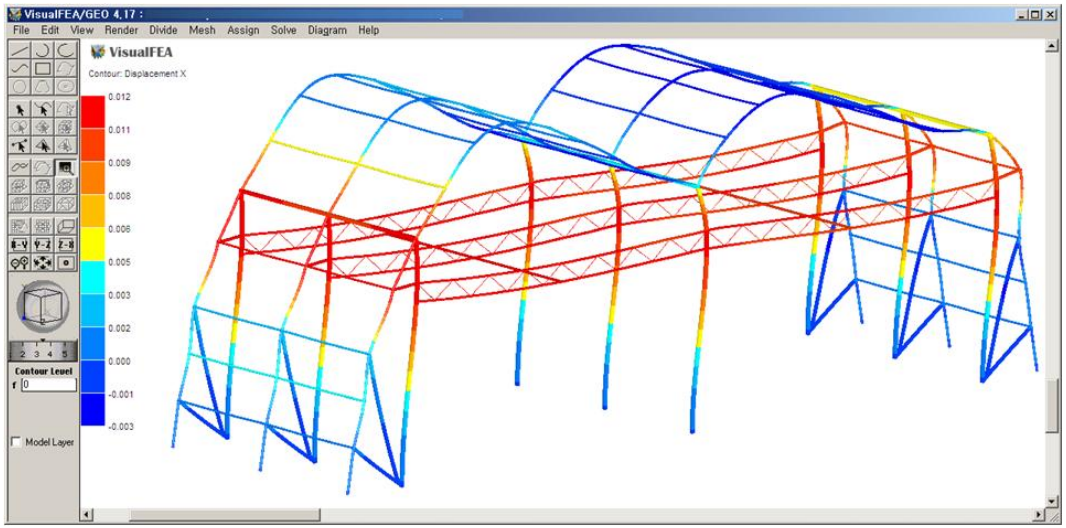


✓ **Snow**

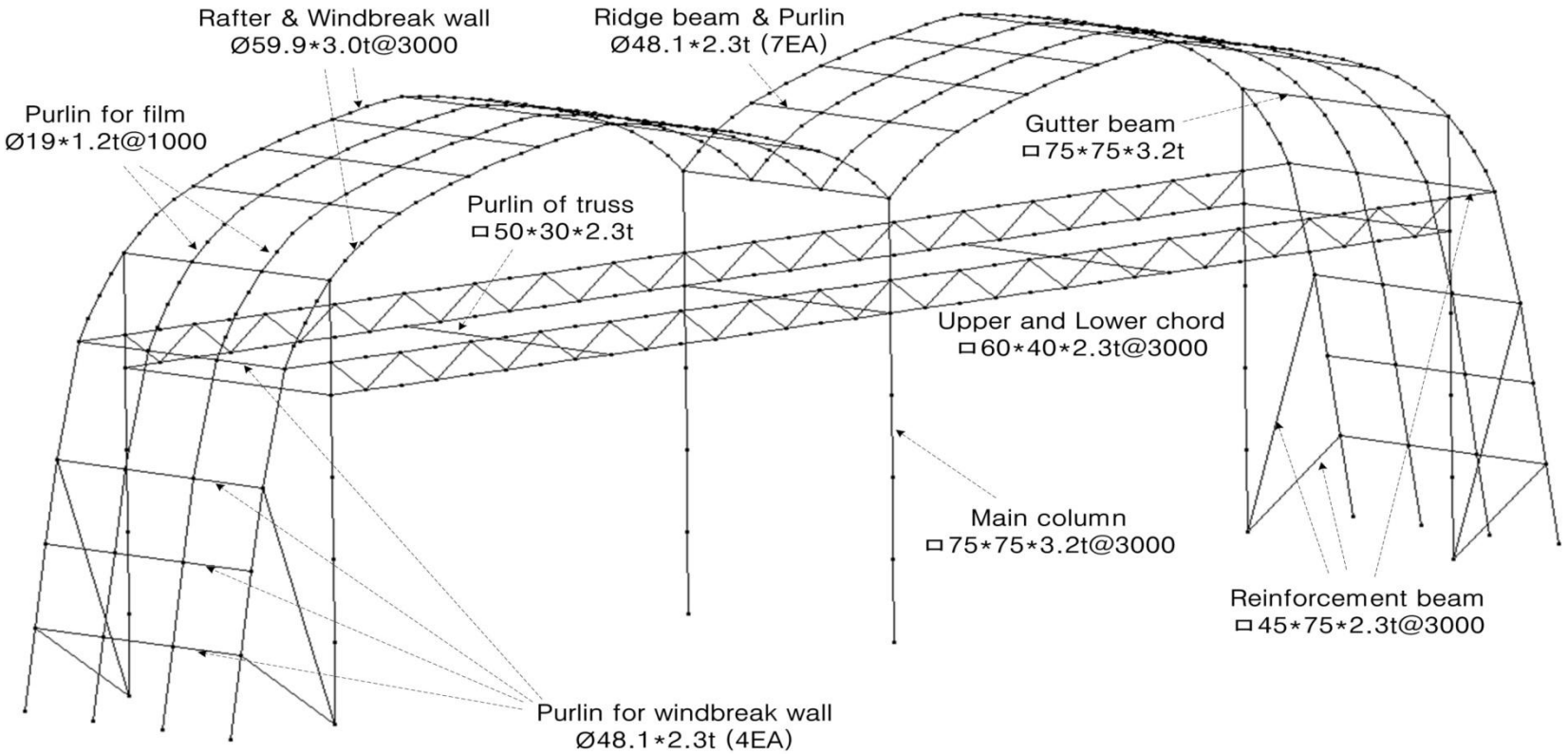
- Design of greenhouse for paprika cultivation: ***Structural analysis***







- Design of greenhouse for paprika cultivation: ***a general drawing***



- *Foundation*

- ***Frame work***

- ***Covering and attachment***




- ***Completion***

Wind(m/s)	40
Snow(cm)	55

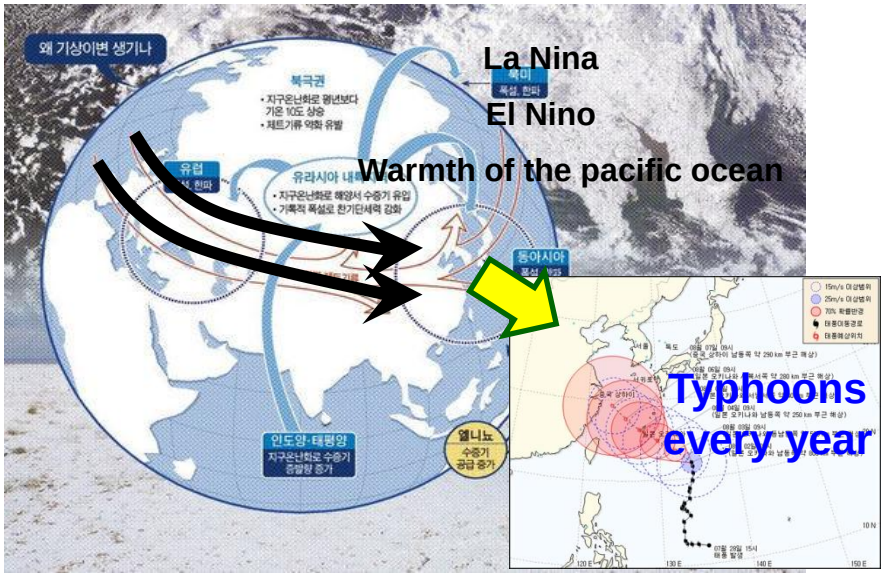
- ✓ **High tech**
- ✓ **Energy saving**
- ✓ **Plant-response-based environmental control to optimize plant growth, maximize productivity and fruit quality**
- ✓ **Computerized climate control of greenhouse(temperature, irrigation, CO_2, …)**
- ✓ **Cost: \$100 per m^2**

- ***Assessment of structural safety***

  - ✓ **Prevention of natural disaster**

  - ✓ **Maintenance, repairing and reinforcement**

- **Reasons of weather disaster**

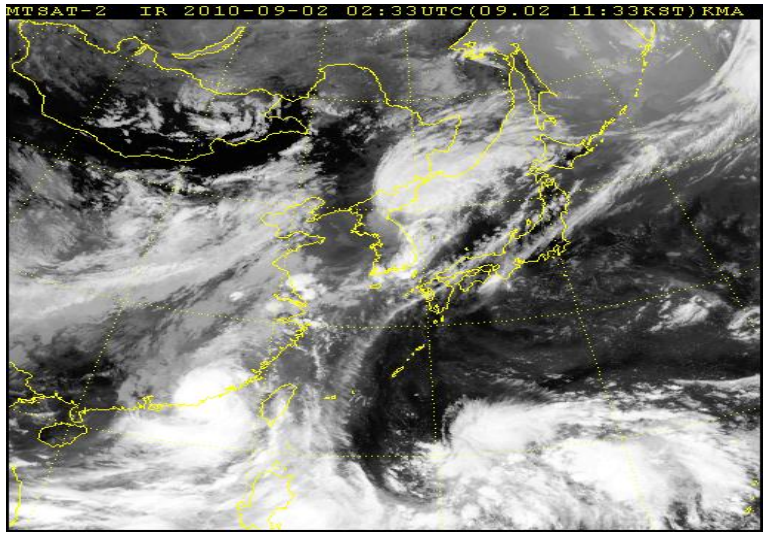


La Nina

El Nino

Warmth of the pacific ocean

Typhoons every year



What happened?

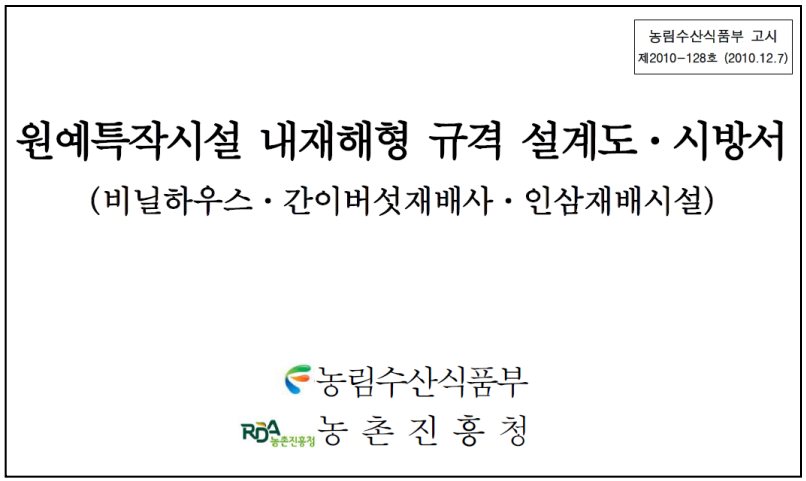
Unexpected heavy snow(2011. 1., KR)

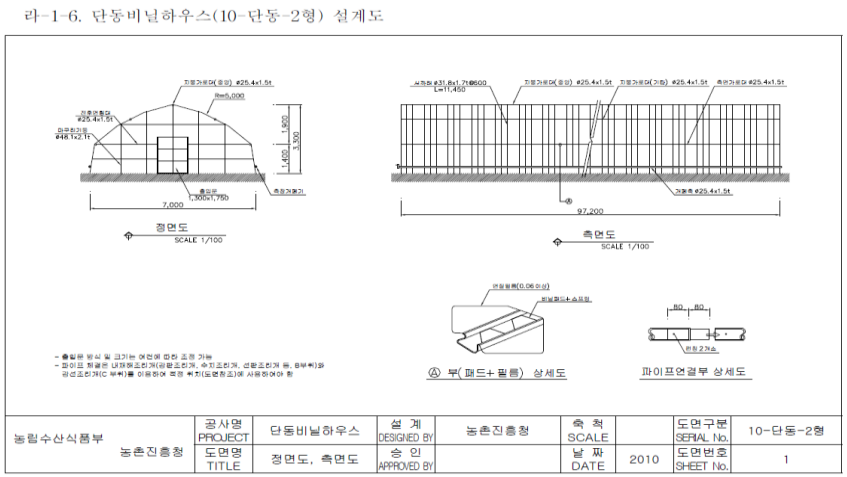
Unexpected typhoon(2010. 9., KR)

○ Characteristics of the recent natural disaster in greenhouse

- Sudden and Huge in scale & happening repeatedly
- Sudden increase in the prices of vegetables
- Discouraged farmer=lose great skills

- ***Assessment of greenhouse safety on field***
- ***48 kinds of greenhouse models****
  - ✓ **Free standing style: 28**
  - ✓ **Free standing style: 5**





* **mifaff.go.kr / rda.go.kr**

Thank you for your attention!

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