

UNIVERSITY OF ILLINOIS EXTENSION



### PREPARING A NEW GENERATION OF ILLINOIS FRUIT AND VEGETABLE FARMERS

a USDA NIFA BEGINNING FARMER AND RANCHER DEVELOPMENT PROGRAM PROJECT GRANT # 2012-49400-19565

http://www.newillinoisfarmers.org





GROWING A NEW GENERATION OF ILLINOIS FRUIT AND VEGETABLE FARMERS

### **CONVERTING TO YEAR-AROUND GREENHOUSE PRODUCTION:** WHY AND HOW

### J. D. Kindhart

### February 2015



### Converting a high tunnel

- Carefully evaluate market and income potential
- Evaluate crops being raised and cultural systems to be used
- Add heat
- Lighting?
- Energy conservation possibilities



## Why convert?

• Year round demand?

Potential to make income?

• No longer have winters off!



### 

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greenhouse vegetable crop budget

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### [PDF] Greenhouse Tomato Budgets for Mississippi msucares.com/pubs/publications/p2780.pdf [\*]

Growing greenhouse vegetable crops and growing tomatoes hydroponi- cally are popular among small producers who want to diversify their farms and ...

### Crop budgets for vegetable and berry growers

www.uvm.edu/vtvegandberry/budgetlinks.html [\*] University of Vermont \* Crop Production Budgets for Vegetable and Berry Growers ... greenhouse tomato budget · N. Carolina Farm Stewarship - 1 acre organic crop budgets ...

Economics/Crop Budgets | North Carolina Cooperative ...

tomatoes.ces.ncsu.edu/tomatoes-economicscrop-budgets/[\*] Also included are sample budgets associated with greenhouse tomato production ... Cost budgets are reported for 20 vegetable crops as combinations of crop, ...

### Crop Production Budgets | UMass Amherst Vegetable ... https://extension.umass.edu/vegetabl... 😁 University of Massachusetts Amherst \*

https://extension.umass.edu/vegetabl... \_\_\_\_University of Massachusetts Amhers to Below are "Process Budgets" for various crops grown in Massachusetts. A Process Budget is a description of the production practices followed in growing a crop, ...

### Center for Crop Diversification Crop Budgets

www.uky.edu/Ag/CCD/budgets.html \* University of Kentucky \* Nov 19, 2014 - ... Budget updates. 2013 Vegetable and Melon budgets ... Virtual Grower An energy cost calculator for greenhouse growers from the USDA ...

### [PDF] Budget for Greenhouse Tomatoes - Agricultural Marketi...

www.agmrc.org/media/emsi/p2257\_47C17DE16228E.pdf 
crop and make the right decisions at the right time. Not as much information is available about greenhouse tomatoes as compared to field vegetables, This can ...

[PDF] Greenhouse Vegetable Production Potential Greenhou... www.hort.vt.edu/ghvegetables/.../Greenhouse\_Vegetable\_Production\_AL...[\*] Spring Crop. • Fall Crop. – Retail. • Spring Crop. • Fall Crop. – Greenhouse and. Field. • Long Season (April 1 to December 31). Greenhouse Tomato. Budgets.

### Organic Greenhouse Vegetable Production | ATTRA ...

https://attra.ncat.org/.../view... [\*] National Center for Appropriate Technology \* Tomatoes are the leading greenhouse vegetable crop, followed by European cucumbers, lettuce, peppers, and culinary ... Cheap sources of energy are key.

### Helpful Links - Vegetable Production - The University of ... vegetables.tennessee.edu/links.html 🚬

 $\label{eq:mississippi} State University, Budget for green house tomatoes \\ \cdot North Carolina Fruit and Vegetable Crop Budgets \\ \cdot South Carolina Vegetable and Melon ...$ 

[PDF] An Economic Analysis of Sequential Cropping Systems... economics.ac.utk.edu/oublications/horticulture/rs0901.pdf [\*]





### Heating options

- Hot water / Boiler
  - Boiler Types
    - Fire tube
    - Water tube
    - Water jacket
  - Fuels
    - Waste wood/biofuel
    - Waste Oil
    - Firewood/Coal
    - Gas
- Unit Gas Fired Heaters



### Heat Requirement

- Hand calculation
  - Greenhouse volume
  - GH surface area
  - R-value of glazing
  - Etc.etc.etc.
- Online calculators

Email | CITES | Illinoi: × ♥ O Outlook Web App × ♥ ACF Greenhouse Hea × ♥ B Photos
 → C A https://www.google.com/webhp?sourceid=chrome-instant&ion=1&espv=2&i

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calculating greenhouse heating requirements

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### Heater Calculator - ACF Greenhouses www.littlegreenhouse.com/heat-calc.shtml •

Our Greenhouse Heater Calculators will show what size heater you need and the ... you can convert it to a heat loss value using this formula: Heat loss value = 1 ... You've visited this page 3 times. Last visit: 2/1/15

### Greenhouses: Heating, Cooling and Ventilation

extension.uga.edu/publications/detail.cfm?number... 

University of Georgia 
Dec 3, 2014 - Greenhouse heater requirements depend upon
the amount of heat loss .... A good outside temperature to use in
heater design calculations (to ...
You've visited this page 2 times. Last visit: 1/6/15

Greenhouse Heating Requirements | Ornamental Production aggie-horticulture.tamu.edu/omamental/greenhouse.../greenhouse-heatin... ▼ Heating is a major concern to commercial greenhouse producers. This is due primarily ... Calculating Greenhouse Heating Requirements. The key to efficiently ...

Greenhouse Heater Sizing Calculator - Gothic Arch ... https://www.gothicarchgreenhouses.com/Greenhouse-Heater-Calculator.h... • Greenhouse Heater BTU Sizing Calculator from Gothic Arch Greenhouses.

### Sherry's Greenhouse - Making an Investment in Heating fo... www.sherrysgreenhouse.com/oldsite/GHheating.html ▼ Sherry's Greenhouse Q & A's -. HEATING YOUR GREENHOUSE. Calculating energy requirements. How do I calculate energy requirements to decide what size ...

### Calculate the cost of heating and cooling a greehouse. - faq.gardenweb.com/faq/lists/strucs/2007011814009742.html $\neg$

Now we can calculate the BTU per hour necessary to heat the greenhouse in ... One BTU is defined as the amount of heat required to raise one pound of water ...

### JungleSeeds Greenhouse Heat Requirement Calculator www.jungleseeds.com/HeaterCalculator.htm +

This section calculates the Power required to heat a greenhouse or conservatory structure in winter based on your input parameters. This calculation is intended ...

[PDF] Greenhouse Energy Considerations - Rutgers School ... aesop.rutgers.edu/.../AJBoth\_GH\_Energy\_Considerati... \* Rutgers University \* Greenhouse Engineering, NRAES 33 ... http://www.nraes.org. Greenhouse Heat-Loss Calculations ... Multiply the calculated heating requirement by: (1 + 0.08) ...

Greenhouse BTU Calculator | Greenhouse Megastore https://www.greenhousemegastore.com/greenhouse\_btu\_calculator +

# R value of some common glazing materials

Single layer 6 mil poly R = 1.15 Double inflated 6mil poly film R = 0.7 Polycarbonate 10mm double wall R = 0.53





### Other heat considerations

- Split required BTU amount to avoid a zero heat situation
- Have back up systems in place
  - Extra fuel
  - Stand by electrical generator
    - Wired with disconnect switch
    - Fired periodically to make sure it will work when needed









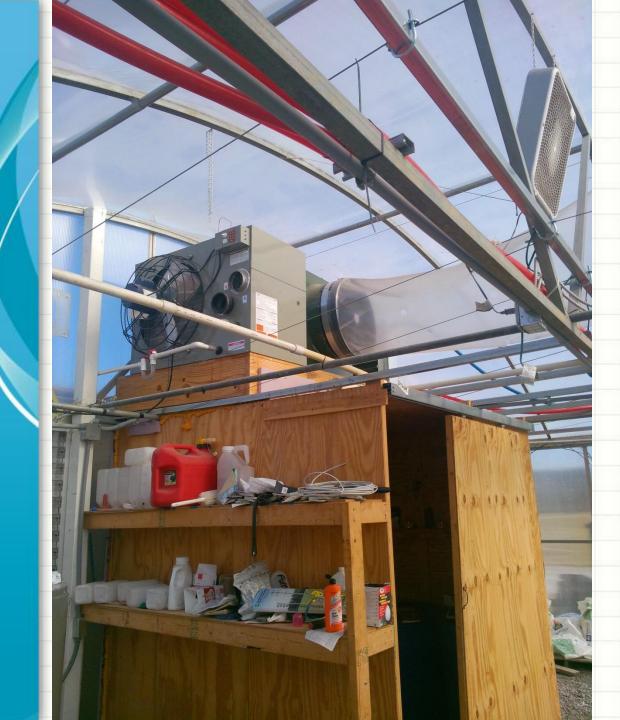






















### **Greenhouse Cooling**

- Ventilation fans
- Whitewash
- Shade cloth
- Fan and pad















## Crops

- Tomato
- Pepper
- Cucumber
- Lettuce
- Herbs



### **Cultural Systems**

- Soil
- Hydroponic



### Bonuses

- Better ability to control humidity
- More rapid crop development
- More predictable



### Drawbacks

- EXPENSE
- Insect pests











































## To reach us

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## If you have questions ...

- University of Illinois Extension Local Food Systems and Small Farms team
  - <u>http://web.extension.illinois.edu/smallfarm/</u>
- USDA's Start2Farm site
  - <u>http://www.start2farm.gov/</u>

