

## Comparison the Energy Consumption in Modern and Ancient Green houses and its Effective Factors

Seyed Nematollah Mousavi & Pegah Shayesteh Gohar

Department of Agricultural Management ,Marvdasht Branch, Islamic Azad University ,Marvdasht, Iran

Corresponding Author: mousavi\_sn@yahoo.com

**Abstract:** Agricultural development and increasing the amount of producing factor profits related to this part such as energy has very importance in our country economic. So in recent years, energy consumption optimization in agriculture department and its role on performance recovery and profit and in result its diligent profitable was paid attention with researchers. Different factors such as applied technology in greenhouse constructions could be effective on energy consumption optimization. So by attention to this important subject related to energy consumption and technology role of green house construction in agriculture department, aim of this research is evaluation the applied technology role in construction of treed cucumber green houses of Tehran province on related energy consumption to this department. The current article is applied using the mining data from 22 completed questionnaires by managers of treed cucumber green houses of Tehran province in 2011 using the logic method. In this research, two models are formed to hypothesis evaluation. In first model, the main independent variable (which we was discussed) was applied technology in greenhouse (ancient or modern) and the dependent variable is energy consumption amount and rate in each m<sup>2</sup> of greenhouse under cultivation area. In second model, the main independent variable was applied technology in greenhouse construction and the dependent variable is energy profit amount and rate. This study results show that contemporary to up to dating and more modernity applied technology in green house constructions of treed cucumber green houses of Tehran province, we will need to lower energy for producing distinct amount and rate of the same product.

[Seyed Nematollah Mousavi & Pegah Shayesteh Gohar. **Comparison the Energy Consumption in Modern and Ancient Green houses and its Effective Factors.** *Life Sci J* 2012;9(4):5965-5968] (ISSN:1097-8135).  
<http://www.lifesciencesite.com>. 894

**Keywords:** Energy Consumption, logic method, Tehran province, Green houses

### Introduction:

Above human population developing and their nutrition need preparations is propelled the humankind towards dense agriculture. Green house cultivation is one of the most important methods related to this kind of agriculture which it has some characteristics such as: characteristics related to greenhouse using for more production in ideal and desired time but with more energy consumption in comparison to the natural and normal cultivation. Hence, economic and energy analysis in addition to technical analysis are among important necessities in greenhouse project evaluations.

This method has some virtues and defaults. One of its virtues is more production rate in area as we can take up to 10 times product more than normal method in the same area (Bakker, 1999). One of other its virtues is out time product crop that it is caused to high rate resources consumption (in money and energy) by farmer to apply this method but greenhouse construction has some defaults, too.

The main default of this method is anomalous energy consumption by producers. Somehow the producer is cultivated by high energy consumption that in our country, energy consumption is more than other countries because of subsidizing energy consumption by our farmers and as a result of low cost related to energy, the farmer doesn't any action to energy

consumption reduce. But finally, the main part of the farmer income will be consumed to energy preparation (for green house cooling and warming).

Therefore, by cultivation method evaluation and also definition the energy consumption steps we could make possible more production by lower energy consumption to energy consumption reduce (Elbatawi, 1998).

Nowadays many studies are applied related to industry and using the machines and instruments role in environment destruction and in according to this, some terms are created such as permanent development. Meantime, energy consumption role and permanent development are important subjects related to development somehow nowadays, some developed countries to evaluation the economic development use to green internal impure production instead of evaluation the internal impure production changes during a distinct period and in this manner, it considers effect of environment destruction costs, contemporary. Greenhouse cover causes to greenhouse effect creation and jailing the solar energy within the greenhouse. Greenhouses which are different from their size will be kept the plants against the severe cold in winter or severe heat in summer.

Green house assigns to a limited space which it has ability the appropriate environment conditions to growth the different region plants during different seasons of a year. According to this definition, some things such as

green house action and preparation the necessary environment conditions and necessary products are defined, too. Green houses will be divided to constant and mobile on the basis of their applied building materials. Constant greenhouses assigns to green houses with stable and durable applied building materials in their construction. So we must use them many years.

In general, green house is a covered building with different materials such as plastic roofs, glazed roofs and plastic and glazed walls. Green house is warm because of absorption the visible solar light (because of glass transparency) by plants, soil and other parts of the building. Hot air with internal hot surface will be kept by the building walls and roofs. In addition to, structures and hot plants within the green house radiate again some of their thermal energy in infrared spectrum which the glass is some deal filmy into it. So, some of this energy will be kept in greenhouse, too but the second process roles as second role in comparison to the previous process (is thermal). This theme shows as opening the small window near the green house roof and the temperature will be reduce, remarkably. Then, applied window in the greenhouse performed as a barrier related to air outflow and its effect is energy keeping within the green house. Hot air near the ground set up a barrier against its unlimited increasing and its exit. However, thermal exit will be happened because of within glass and other building material's thermal conduction and also, pure energy within the green house (and in result temperature) increases.

In Varamin despite constructing many green houses and such other construction request, evaluation on constructed green houses from the point of view of consumed energy rate is very necessary and it can be very important. So tender any method that can has the positive role on energy consumption reduction, could cause to reduce the final product cost and in result producer's increasing income.

#### **Theoretical literature:**

Concerning internal researches, it can point at related accomplished studies such as Tachi et.al (2011) in their study as name the analysis of energy utility related to greenhouse cucumber product attended to data covering analysis related to Shahreza located in Isfahan province and showed that fuel with 47% and consumed water with 2 % allocate maximal and minimal energy consumption portion, respectively. These results indicated that in return to constant indicator as a model, 24% and in return to variable indicator as a model, 36% of whole units had 100% as utility and other units will be inefficient in different degrees. Means of technical utility, pure technical utility and indicator utility evaluated as 90/37, 95/09 and 94/6, respectively. Also, Mean of technical utility related to inefficient units was evaluated as 87% in constant indicator that it means 13 % whole resources could be saved by increasing these unit utilities. In this research, maximal incorrect energy consumption and also maximal whole saved energy is

related to the consumed fuel. Also, Marsalis et.al (2005) about evaluation the northwest green houses of Europe expressed that these greenhouses consume lots energy which most portion of the consumed energy uses to green house heat and ventilate. In their applied study, they showed that by technology changing such as replacing the using anti perspiration materials in tomato, pepper and cucumber, respectively could reduce the energy consumption rate as 5/5-10/4, 5-9 and 2 to 5%. This energy consumption reduce has not any effect on performance reduce.

Medina et.al (2006) also expressed that greenhouse technology enhancing can increase the performance and quality rate. Whole consumed energy for 1 ton tomato is equal to 1108/7 Mega jowl in tone which it is so lower than the same in north of Europe. Ground size in a year for 1 ton is 3/85 meter and water amount is 28 liter/kg. They resulted in the end that Tomato performance and output recovery and also Water consumption (usage) efficiency (WUE) create in result of technology increasing which it is one key factor for environmental effects. Chetin et.al (2008) during evaluation the tomato produce greenhouses as industrial found that tomato produce needs to 455/3GJ/1000m<sup>2</sup> as energy consumption that their 34/82% is related to fuel energy and then to compost and following to machine energy. Energy rate is 0/8 and energy profit is equal to 0/99 kg/MJ. Iera yeozoz et.al (2003) evaluated two green house products means tomato and asparagus in Navaria related to Spanish and they evaluated the technical efficiency related to these two product crops. Their results showed that farmers could reduce the produce costs using the high output choose and also, they cause to performance and profit increasing.

#### **Discussion and conclusion:**

In this section after date mining related to 2011 to some of green houses of Tehran province which they were holding the cucumber cultivation, using logic method and creation the proper function to the scientific framework, this measurement applied. Onset, in the first model, some variable effects such as manager's education level, greenhouse age, and ownership kind and finally the applied technology will be evaluated on energy consumption in under studying greenhouses. In second model used to independent variables .To evaluate these variable effects on energy profit uses of the first model. In this section, at first above mentioned subjects is Reviewed in summary and then a description related to these variables and also research method will be introduced. At the following, extracted results of this research and research hypothesis tests will be evaluated. And in the end, in according to these results, some recommendations will be introduced to energy consumption reduce and its profit management in our country greenhouses. In this conclusion must say that in this study, two models will be created to research hypothesis Tests. In first model will be attended to

effective elements on energy consumption in treed cucumber greenhouses. In this model we will try to test the zero hypothesis related to that energy management in modern greenhouses is better than ancient ones and it will be caused to better energy consumption. Hence, in this model is used to energy consumption rate in each  $m^2$  from cultivated area as the dependent variable. In dependent variables are also such as green house age, greenhouse ownership kind, manager's education level and applied technology in the green house. In this model, applied technology in the green house was as the most important designed variable and so we want evaluate its effect on the dependent variable. In second model is used to energy profit as the dependent variable to evaluate the effective elements on energy profit in under studying green houses and most important of whole, to evaluate the applied technology role in the greenhouse in energy profit in this section. In dependent variables are as same the first model means green house age, greenhouse ownership kind, manager's education level and applied technology in the green house. In this model, applied technology in the green house was as the most important designed variable and so we want evaluate its effect on the dependent variable. One special kind of statistic evaluates are regression pattern that dependent variable in it will be defined as a qualitative variable. So in many regression analysis, dependent variable not only is under effect of quantitative variables (such as: income, cost and price (with the current indicators, but also it follows the qualitative variables in their nature, too. On this basis qualitative variables, in general, indicates being or not being a quality or a character. So that one related method to numeration these characteristics is considering some imaginary variables with accepting two amounts: zero and one for it that the zero number expresses its character inexistence and one shows its existence. Thus in this study two above models will be studied using the logic method. Now a days, this method calculates as one of most applied statistic methods that it has a special position and level in different kinds of experimental studies and it uses in the current study to its qualitative data and also logic method benefits. In this section defined that many elements will be effective on energy consumption profits in green houses and also energy consumption rate evaluating such internal and external studies related to the current study subject. Which model measurements will be showed that independent variables, that it's most important is applied technology in the greenhouse; will be effective on the dependent variables. In according to hypothesis and current related studies to agriculture development and growth, one of most important necessities related to agriculture development and growth in every society is saving and best energy using. Hence, discussion of best energy using management and its following energy consumption costs and prices are from diplomat and economic office manger's principal aims related to each active office in our country agriculture department.

Nowadays not only in Iran but also in the universe, energy lack and .In result its high energy consumption costs is changed as one serious problem to agriculture department and society economics. Because that management discussion and also best energy using has a definite role in agriculture activities and need and necessary nutrient preparations not only in its economic aspect but also in social and political aspects, too. On one hand nowadays introduces that we could using the new technologies, reduces energy consumption price and cost by saving in its use and following increases the profit amounts of agriculture department which it is one of most vital related to economic departments, using development the new science and techniques and using the appropriate and suitable instruments and tools to energy consumption rate reduce and high energy profit. It can be addressed that agricultural economic development and raise in European societies in recent decades shows results of using the new techniques and minimizing energy consumption rate. Also applied studies related to agriculture economic shows that the government could has an effective role in development of our country agriculture department by itself punitive and /or bonus tools and techniques. Therefore, governor protection from our country agriculture department is located a lot importance. One of the most current ways related to protection from economic offices is presentation the credit facilities for preparation the suitable condition to use of new techniques and also prevention of energy consumption more than need limit. Because that best energy using is one of most important problems which all societies are in confronting to it, there are many studies and hypothesis in this field. Which each of them (whether internal or whether external) is often studied one variable effect on energy profit. In current study, by adding and summing up whole these studies and hypothesis, we attended to evaluate the green house construction technology role (how modern or ancient) on energy profit and consumption in our country green houses. These model estimated results showed that up to dating the technology related to green house construction has the positive and significant role on energy profit and its suitable management related to energy consumption as this with more up to dating these green house constructions, product cost of each product will be decreased in corresponding to energy consumption decrease and it will be following caused to profit and development of agriculture department. So greenhouse modernity indicates as one important element in energy consumption decrease and also development the energy profit rate in our country green houses. Also green house age as a variable has a negative and significant effect on energy profit and against it will be caused to more energy consumption. Green house age rising for necessary attrition and inefficiency cause to lower energy preparation cost for each product crop. Kind of green house ownership is another important element in energy consumption by our country green houses; too,

somehow concurrent to rising rate of private ownership, energy consumption management will be more appropriate, too. In result, we will expected that private green houses have better energy consumption management than others and in these greenhouses, energy profit rate will be upper and better and then energy consumption costs will be decreased, considerably. In addition, according to extracted results, manager's education level is another important element on energy profit so; there is a significant and positive relation between energy profit and green house manager's education level. In result we expect that energy consumption rate and amount for each product crop will be decreased with rising green house manager's education levels and the following it, energy profit rate will be increased because that high educated managers will be noted as social capital and source that this social capital has the positive effect on product function and also increasing the whole product elements profit rate. Therefore, it can be concluded that green house manager's education level will finally caused to product cost reduce and the following agriculture department development and growth. Most important extracted results in this study are as follows in summary:

- a) Using of the new technologies as one important tool for rising energy profit and recovery rate in our country green houses is posed.
- b) There is a positive and significant relation between energy profit and green house manager's education level so green house manager's education level can cause to product cost reduce and also agriculture department development and growth.
- c) Green house ownership kind is one other important involved element on energy consumption rate in our country greenhouses so concurrent to rising private ownership, energy consumption management will be more appropriate, too. Undoubtedly, increasing rate of energy profit and recovery will be one defined element in future economic level of both developing and developed countries. Therefore, attention to this economic phenomenon in strategy writing and economic growth policies especially in agriculture economic is one necessary work and one of agriculture policies and manageress's important aims. Here about, attention to related applied studies could more effective help in increasing the energy profit and recovery rate in our country green houses. So on these research findings, the following cases will be recommended:

- 1-Using of the new technologies in our country greenhouse constrictions
- 2- Using of high educated managers and employers in our country green houses.

#### Resources:

- 1) Ashrafzadeh, Hamidreza and Mehregan Nader (2008), Economic measurement of data panel, Tehran,

Cooperation and team work research institute of Tehran university.

- 2) Eghtedari Naeeni, Abdolreza (2010), Energy consumption reduction in green houses, National seminar related to new agricultural ideas, Khuzestan, Azad university, 17 and 18 th February (2010).
- 3) Bakker, R. (1999). Effect of Green house Construction on Future Energy Consumption in Green house Rapport Landbouw Economisch Institute Lei. No. 1.99.06, 58pp.
- 4) Bartok, J., & Ithaca, J. (2001). Energy Conservation for commercial Green houses. NY: Natural Resource, Agriculture and Engineering Service.
- 5) Bosseboef, I. D., Chateau, B. B., Lapillone, B. (2000). "Energy efficiency policies and indicators " world energy council studies, 28(2), 123-150.
- 6) Brumfield, K., Both, A., & Wulster, G. (2009). How Are Green house Growers Coping with Rising Energy Costs? NJ: New Brunswick.
- 7) Canakci, M., & Topaci, I. (2005). Energy Use Pattern of some field crops and vegetables production: case study for Antalya regions. Turkey. Energy conservation and management, Vol. 46. Pp 366-655.
- 8) Elbatawi, I., & Namba, K. (1998). Utilization of solar energy for heating a green house at ighttime. Proceedings 26 th international symposium on agricultural engineering, Opatija, Croatia, 117-124.
- 9) Heidary, H. (2003). the role of climate in green house design emphasis on temperature parameters to reduce.
- 10) Hulsbergen, K., Feil, B., & Diepenbrock, W. (2002). rates of nitrogen application required achieving maximum energy efficiency for various crops: Result of a long term experiment. Field crops research, Vol. 77. Pp. 113-135.
- 11) Janick, J., & Harry, S. (2009). The cucurbits of Mediterranean antiquity: Identification of Taxa from ancient images and description. Retrieved from annals of botany, doi: <http://dx.doi.org/10.1093/aob/mcm242>
- 12) Sedighi, Hamid Reza and Lavler, Kei (2007), Economic measurement by applied approach, Translated by: Shams aloh Shirin Bakhsh, First publication, publisher: Avaye Nour, Tehran.