Counterbalance by Cropping System: Changes Less, Gets More

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Introduction

At the present time, there are many problems in our world, for example, food crisis, energy crisis and environmental crisis which are three of the big problems. We now have an environmental problem from using fuel and, consequently, we have an energy problem because of the running out of fuel. The way we are trying to find to solve these problems is the using of alternative fuels named Gasohol and Biodiesel. Those will have and effect on food stability that may well cause food crisis.

Balancing of the production food and raw materials of fuel is needed, in order to prevent food and energy crisis. Moreover, we can also reduce the hazardous of the environmental crisis by using alternative fuels. Therefore, it will be a very big advantage if we change an idea of cropping.

1. Energy Crisis

A statement of the problem

Abundant and economical energy is the life blood of modern civilizations. Coals, nuclear and hydro are used primarily to make electricity. Natural gas is widely used for heating. Biomass, meaning wood and dried dung, is used for heating and cooking.

Oil powers almost all machines that move and that makes oil uniquely versatile. Oil powered airplanes carry 500 people across the widest oceans at nearly the speed of sound. Oil powered machines produce and transport food. In North America there are many more seats in oil powered vehicles than there are people. Oil powered machines are ubiquitous. Clearly, we live in the age of oil, but it is drawing to a close.

Oil discovered 40 years ago is the basis of current oil production. The search for oil continues but projected oil discoveries will contribute little to projected oil production in 2030. The declining rate of oil discoveries makes it painfully obvious--most of the oil has already been discovered. The technology for finding oil has improved greatly since the major discoveries, yet little oil has been found in recent years. The heyday of oil discovery was from 1950 to 1980. It is difficult to avoid the conclusion--most of the oil has been found. World oil production is running flat out. Soon there will be a gap between production and demand. The remaining oil will be expensive and difficult to produce, refine and transport.

Thailand energy situation

Thailand Energy Situation 1st Quarter 2009's report said that, Thailand's consumption in the 1st quarter of 2009 was reduced 0.49 % from the same period last year. Oil was used at a higher share than other energy resources by 46.68 % of the total energy consumption. Using of renewable, electricity coal/lignite was used at 18 97%, 15.51%, 15.02% and 3.82 % respectively.

Renewable energy plays an important role in the energy conservation. When renewable energy sources are used, the demand for fossil fuels is reduced consequently. Thailand's policy is to promote the using of alternative energy, Gasohol and Biodiesel, by reduced those prices. Moreover, government of Thailand also supports the producing of raw materials for Gasohol and Biodiesel which are corn, cassava and oil palm by planning to increase planting area of those crops.

2. Alternative Energy

Alternative energy refers to energy sources that have no undesired consequences such for example fossil fuels or nuclear energy. Alternative energy sources are renewable. They all have lower carbon emissions, compared to conventional energy sources. These include Biomass Energy, Wind Energy, Solar Energy, Geothermal Energy, Hydroelectric Energy sources.

Alternative Energy divided in 2 categories of theirs original resources; alternative energy from depleted resources such as coal, natural gas nuclear, peat and oil sand etc. and the other alternative energy from non-depleted resources which can be renewable such as solar, wind, biomass, hydro and hydrogen etc.

Renewable energy

Renewable energy sources can be replenished in a short period of time. The use of renewable energy is not new. More than 150 years ago, wood, which is one form of biomass, supplied up to 90 percent of our energy needs. As the use of coal, petroleum, and natural gas expanded, we became less reliant on wood as an energy source. Today, we are looking again at renewable resources to find new ways to use them to help meet our energy needs.

The production and use of renewable fuels has grown more quickly in recent years due to higher prices for oil and natural gas. The use of renewable fuels is expected to continue to grow over the next 30 years, although we will still rely on non-renewable fuels to meet most of our energy needs. The five renewable sources used most often are:

1. Biomass - Including wood and wood waste, municipal solid waste, landfill and biogas, ethanol and biodiesel.

2. water (hydropower)

3. geothermal
4. wind
5. solar

Ethanol made from corn and other crops

Ethanol is a clear, colorless alcohol fuel made from the sugars found in grains, such as corn, sorghum, and wheat, as well as potato skins, rice, and yard clippings. Ethanol is a renewable fuel because it is made from plants. There are several ways to make ethanol from biomass. The most commonly used processes today use yeast to ferment the sugars and starch in corn. Corn is the main ingredient for ethanol in the United States due to its abundance and low price. The starch in the corn is fermented into sugar, which is then fermented into alcohol. Other crops such as, barley, wheat, rice, sorghum, sunflower, potatoes, sugar cane and sugar beets can also be used to produce ethanol.

Sugar cane and sugar beets are the most common ingredients for ethanol in other parts of the world. Since alcohol is created by fermenting sugar, sugar crops are the easiest ingredients to convert into alcohol. Brazil, the country with the world's largest ethanol production, makes most of its ethanol this way. Today, many cars in Brazil operate on ethanol made from sugar cane.

As a transportation fuel, ethanol can be used as a total or partial replacement for gasoline. Gasoline containing ten percent ethanol - E10 - is used in many urban areas that don't meet clean air standards. All vehicles that run on gasoline can use E10 without making changes to their engines. Over 99 percent of the ethanol produced in the United States is mixed with gasoline to make E-10.

E85 is an alternative fuel that is 85 percent ethanol and 15 percent gasoline, used mainly in the Midwest and South. Vehicles are not modified to run on E85; they are specially manufactured as flexible fuel vehicles (FFV). Flexible Fuel Vehicles can use any mixture of ethanol and gasoline up to E85. There are about 146,000 cars and trucks using E85. Most of these are fleet vehicles.

Biodiesel made from vegetable oils and animal fats

Biodiesel is a renewable fuel that can be used instead of diesel fuel made from petroleum. Biodiesel can be made from vegetable oils, animal fats, or greases. Most biodiesel today is made from soybean oil. About half of biodiesel producers are able to make biodiesel from used oils or fats, including recycled restaurant grease.

Biodiesel is most often blended with petroleum diesel in ratios of 2 percent (B2), 5 percent (B5), or 20 percent (B20). It can also be used as pure biodiesel (B100). Biodiesel fuels can be used in regular diesel vehicles without making any changes to the engines. It can also be stored and transported using diesel tanks and equipment.

Fueling engines with biodiesel has just started to catch on, but this isn't a new idea. Before petroleum diesel fuel became popular, Rudolf Diesel, the designer of the diesel engine, experimented with using vegetable oil (biodiesel) as fuel.

3. Alternative Energy Situation in Thailand

Potentials of Biodiesel Production in Thailand

Raw materials or feed stocks with potential for biodiesel production in Thailand are such as: the used vegetable oil and new extracted vegetable oil of these following 8 plants

1. Palm oil
2. Coconut oil
3. Soy bean oil
4. Ground nut oil
5. Castor oil
6. Sesame oil
7. Sunflower oil
8. Jatropha oil (physic nut oil)

As stated by **Biodiesel Development and Promotion Strategy** (18 January 2005), the main feedstock for biodiesel production is ***oil palm***. Oil palm is a plant with high competitive potential due to its lower costs in production and marketing than other plants. Besides, palm can be utilised diversity in consumption goods (Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, 2004)

Biodiesel potentials from oil palm in Thailand

A present production capacity of biodiesel is at 500,000 l/day from palm oil left from domestic consumption and the raw palm oil extraction factories with expanding capacity for receiving of increased raw palm almost in double. Furthermore, the Stiarin Palm, which is a by-product from palm oil extraction, can also produce the biodiesel. However, oil palm is the plant requires a lot of water and nutrients, thus it is suitable with the climate at the south.

Gasohol Use in Thailand

Gasohol production in Thailand had originated by the Royal Project of King Bhumibol in 1985, in the **Study Project on Gasohol Production for an Alternative Energy** by producing ethanol from cane. Later on, awakening of promising ethanol occurred towards the public and private sectors to participate in development and tests with engines.

In 2000, PTT carried out the tests of using gasohol in cars and found that it helps reducing of pollution, saves energy and no effect to the car performance. Alcohol production from fresh cassava bulb has been conducted by Science and Technology Research Institute of Thailand, which then would delivery to Bangchak Oil Refinery for gasohol production. An experiment for distribution in 2001 was for 5 BangChak gas stations in Bangkok. Gasohol price was slightly lower than of the unleaded gasoline 95, thus getting satisfied achievement from the people acceptances.

The E20 Gasohol Promotion Policy

To promote using of E20 gasohol (octane No. 95), an Energy Ministry designated its retail price at 2.0 baht/liter lower than E10 gasohol or at 6.0 baht/liter lower than gasoline 95 (pricing in January 3rd 2008 of E20 gasohol at 27.29 baht/liter and E10 gasohol at 29.29 baht/liter with a 33.29 baht/liter of gasoline 95)

4. Alternative Energy and Agriculture, Food or Fuel

Why are we growing food to feed cars instead of people?

The global drive for a new green fuel to power cars, lorries and airplanes is worsening world food shortages and threatening to make billions go hungry. Biofuels, enthusiastically backed by the US, UK and other European governments, have been sold as the solution to global warming. Making fuels from growing crops has been marketed as the way to cut climate pollution while continuing to drive.

But now experts are warning that this could all be a disastrous mistake. Converting large amounts of land to crops for biofuels is reducing food production just when the world needs to increase it. According to the World Bank, this is putting pressure on countries' precarious food supplies.

There are plans by more than 20 countries to boost production of biofuels over the next decade. The US is talking about trebling maize production for ethanol, while the European Union is aiming to make biofuels 10% of all transport fuels by 2020. It is perfectly possible for the world to feed itself, but it depends on how we are growing food. If we continue to grow crops to feed cars rather than people, we're in trouble.

Thailand government policy promote using Gasohol and biodiesel

Thailand’s government supports using and producing of Gasohol and Biodiesel from domestic agricultural production by plans to raise up the planting areas of the raw materials, for example, sugarcane, cassava, oil palm, physic nut and corn. The increasing of oil material’s planting areas is decreasing food’s planting areas leading to higher price of food and the decrease of food supply. So, planning is the most important thing which we must concentrate on. Our goal is to increase production efficiency to ensure enough food, feed and energy at lower investment.

5. Cropping System

A cropping system is a producer's map of their approach to production. It can be as complex or as simple as he or she would like to make it. Economics dictates what is sustainable in the short term. But short term production must always be balanced by what is sustainable over the long term. We know that production practices that only mine the soil for nutrients, and that disregard soil erosion eventually deplete the soil of the potential to be productive. The lack of diversity in a cropping system is an opportunity for weeds, diseases, and insects to find their niche. Cropping systems that mimic the native environment stand a better chance of long-term sustainability. Modern agricultural methods dictate that crops be grown in monocultures for ease of planting, managing, and harvesting. But a measure of diversity can be achieved through crop rotations and direct seeding.

Cropping is divided into these following types:

- **Mono cropping** – Growing the same crop year after year on the same land, without crop rotation through other crops.
- **Crop rotation** – Growing a series of dissimilar types of crops in the same area in sequential seasons for various benefits.
- **Multiple cropping** – Growing two or more crops in the same space during a single growing season.
- **Inter cropping** – Cultivating two or more crops in the same space at the same time. Additional crop is planted in the spaces available between the main crops.
- **Sequential cropping** – Crop are grown in sequence on the same field, with the succeeding crop planted after the preceding crop is harvested.
- **Relay cropping** - The planting of a second crop after the first crop has flowered; in this system there still may be some competition for water or nutrients.

Cropping systems concepts and approaches

The farmer is the ultimate integrator of technology components. He makes the ultimate decisions that determine the success or failure of any agricultural research program. Therefore, the scientists must present alternatives that expand the farmer's option.

The systems approach to multiple cropping is based on the utilization of a farmer's resources to provide for the family. A farmer's well-being is largely determined by how efficiently he uses available resources. Scientists can influence his well-being by showing him how to effectively use his resources or how to increase those resources. Increasing farm resources can often increase farm productivity to meet the needs of the society. However, to help the farmers, the scientists must first understand resource utilization patterns and how particular cropping systems influence them. Therefore, scientists must understand the intricacies of the farmers' present cropping systems before introducing changes.

Cropping system designs

Cropping patterns are designed on the basis of site characteristics to achieve greater productivity. The site determinants and characteristics must be carefully used in the design so that the designed patterns stand more chances of developing into stable, productive, and profitable systems.

Cropping system approach

Cropping systems research program is based on a scientific approach that recognizes several well-defined domains.

- First, the target area is placed in agroclimatic classification to explain the performance and stability of the existing cropping patterns. This helps determine the feasibility of growing new crops and cropping patterns and the potential for agricultural development, and to extrapolate from research results at one site hypotheses at a similar one.
- Second, farmers' characteristics, needs, and available resources are conceptualized. Utilization of the biophysical potential of a certain area is largely dependent on the socioeconomic conditions there. The actual need, capabilities, and characteristics of the farmers must be clearly understood first. Then the new improved cropping systems technologies are designed, tested, and recommended in accordance with the existing resource base and adoption capability.
- Third, a scientific model is used to determine the fit of the designed cropping systems with the farmers' resource base and socioeconomic background. The model should be practical and efficient so that components of the production complexes and farming systems can be integrated.
- Fourth, the process must have a built-in mechanism through which research and extension can jointly operate and contribute to technology generation, verification, and use.

6. Conclusion

Cropping system will solve the food and energy crisis and appropriate system will increase the agricultural production. But the different area of cropping needs the different way to crop. Therefore, we need new researches to find out an appropriate cropping system for each area which has its own climate, environment and other factors. The researches require the basic details of each area to create the best system of that area.

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