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Research Paper :

Performance evaluation of SPV light trap cum lantern

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ABSTRACT

Presently light traps are working on conventional A.C. electricity which is not economical with respect to depleting conventional energy sources and it is also difficult to operate in agriculture fields as supply of electricity is not available everywhere. Also lanterns are used everywhere in rural sectors as well as during the load shading time in the urban sector. In present era of energy crisis, solar energy is abundantly available. Considering the demands, a light trapper cum lantern, working on the SPV technology was developed and tested for its performance. The developed light trapper cum lantern consisted of a solar array panel of 1058cm^2 to recharge the battery in the day time from 8.00am to 6.00pm and its performance was tested by using a 9 watt lamp. A battery of 6 volt; 4.5 amp-hr was used. The SPV panel had 18V; 1.5A voltage and current. An average working hours was 5. It collected maximum insects in the range of 40-60 at temperature range of 27-30^{0}C. Also as wind speed increased above 5kmph the number insects collected were observed to be decreased.

Key words : SPV light trap cum lantern, Performance evaluation, Lantern

Energy is the one of the important inputs to agriculture as well as the industries. Demand for the energy from both the sections is constantly increasing with rate of development in either field. Solar photovoltaic is a technology that directly converts the sun's radiations into electricity based on the physical processes that requires no moving parts. It is possible to generate about 120 W of electrical power form a 10 ft^2 area of SPV panel on sunny days. SPV is reliable in different scale applications. India is endowed with very good solar energy resource. The average intensity of solar radiation received by India is 200 MW/km^2. Even if 10% of available area can be used, the available solar energy would be 8 million MW, which is equivalent of 5909 (million tones of oil equivalent) m toe per year.

Now days, SPV technology is being efficiently used for lightening of streets, residences, hotels, schools, clinics etc. It is used for running electro-mechanical equipments like radio, fan, T.V., refrigerator, pump sets etc. Also SPV supplies electrical power to operate poultry incubators, rice mills, cinemas, telecommunication equipments and charging Ni-Cd batteries.

Presently light traps are working on conventional, A/C electricity which is not economical with respect to depleting conventional energy sources and it is also difficult to operate in agricultural fields as a supply of electricity is not available everywhere.

Also, lanterns are operated on kerosene/LPG, dry batteries or batteries charged on electricity. Lantern is used in field as well as home during time of load shading. The insect light trap could be used as lantern if its design is modified to some extent.

An attempt /study was made to control the insects causing agricultural economic losses by developing a light trapper cum lantern which would attract and kill the insects as well as can be used as lantern as and when required.

METHODOLOGY

Funnel type SPV trapper cum lantern: This solar photovoltaic operated insect light trap cum lantern (Fig. 1) worked on the SPV technology. The performance was evaluated by using 9W lamp. It used a battery of 6V; 4.5 Amp-hr. The SPV panel had 18V; 1.5A voltage and current. The working hours of the battery were 5 hrs. All the set up was shown in Fig. 1.The battery was charged on solar panel of 1058cm^2 size from 8.00am to 6.00pm. Also wind speed was noted to know the velocity of wind, which would affect during performance evaluation of the insect collection. The details regarding the solar photovoltaic operated insect light trap cum lantern are presented in Table 1.

Components of light trap cum lantern:

Solar array-It was used for converting the sunlight into D.C. electricity to charge the battery.

Lantern-It makes provision for placement of inverter circuit and battery box and it was used for lighting purpose.

Hopper- Hoper was used for collecting insects. As