Laparoscopic sterilization without electricity – an experience from Mandla District, Madhya Pradesh, India

The introduction of laparoscopic sterilization into the Indian Family Welfare Programme has made female sterilization more convenient and less time-consuming[1,2]. Laparoscopy requires a high level of skill on the part of the physician, but it can be performed on an out-patient basis under local anaesthesia. Due to this convenience such sterilizations are performed in mobile and hospital out-patient settings. Women may find it more acceptable because it can be performed quickly and leaves only a small scar[3,4]. Laparoscopic sterilization has been available since the early 1980s in India and was for a long time considered suitable for provision in both institutional and mobile settings.

Madhya Pradesh is the second largest state in India with 48 districts. Most of the districts are backward, where basic amenities like adequate water supply and regular electricity supply are deficient. Power crisis in the state has deepened and the electricity shortage during the peak and off-peak hours has crossed over 1500 and 700 MW respectively. Under the new load-shedding schedule, the divisional, district and tehsil headquarters, besides rural areas are likely to witness power cuts for 3, 5, 12 and 14 h daily respectively (http://www.zeenews.com/news540022.html).

The present power situation forced us to think of some alternative arrangements for laparoscopic sterilization operation in rural setting during laproscopic tubectomy (LTT) camps.

A laparoscope is fitted with an optical fibre which is made up of the core (carrying the light pulses), the cladding (reflecting the light pulses back into the core) and buffer coating (protecting the core and cladding from moisture, mechanical damage, etc.). Together, these can carry up to 10 million messages at any time using light pulses. Fibres are used instead of metal wires because signals travel along them with less loss and are immune to electromagnetic interference[5,6].

Under the Indian Family Welfare Programme, the first LTT camp was organized at the block Mawai, about 45 km from district headquarters, Mandla, Madhya Pradesh. All the necessary arrangements for LTT were made at the sub centre of Mawai block with the help of the local health authority. Sixty-two women had registered for LTT and their consent was obtained. The camp was to start at 5 p.m. However, there was a power failure and all the three available generators failed. Out of the 62 women, 18 left the camp, and declined to undergo LTT. The next morning we decided to use solar energy to carry out LTT.

Sun rays were made to fall on the rear-view mirror of a motorcycle. The light beam was directed through a glass window into the operation theatre. The beam was focused to a point with the help of a convex lens of a pair of spectacles. The distal end of the optical fibre cable was adjusted at this point, and the proximal end was fixed to the laprocator (Figure 1). The intensity of the light produced was just sufficient to visualize the fallopian tubes and thus complete the task efficiently. Thus sunlight was used in place of the light source (a halogen lamp (150 W/220 V) which reflects light that passes through an optical fibre cable attached to the laparoscope). Out of 44 cases so operated, 42 were followed up and found successful. A similar situation arose at camps in Sahajpur and Belkheda, where 50 cases were operated using a similar technique.

An experiment was carried out at the Department of Physics, Rani Durgawait University, Jabalpur, with the help of a Lux meter. The intensity of light was measured for the halogen lamp and reflected and focused sunlight at the distal and proximal ends of the optical fibre cable, and the results were compared (Table 1).

Table 1 shows that the intensity of light with solar energy is equivalent to that with the halogen lamp used in the

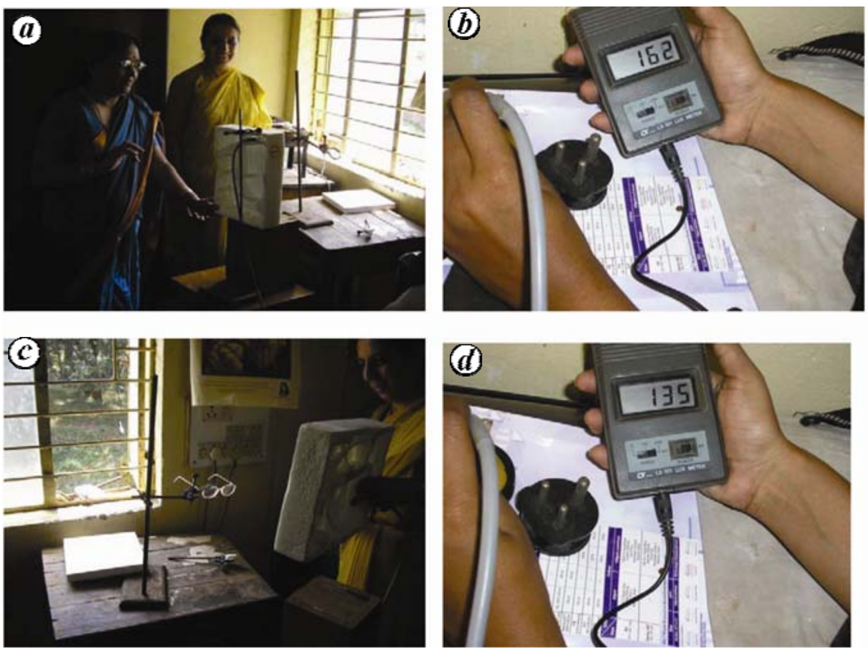

Figure 1. ***a***, ***c***, Sunlight through convex lens (spectacles) passing through the optical fibre cable of the laparoscope. ***b***, ***d***, Measurement of intensity of sunlight through convex lens (spectacles) passing through fibre optical cable of laparoscope using Lux meter.

Table 1. Comparison of intensity of light using solar energy and halogen lamp

Input end*		Output end*	
With halogen lamp	With solar energy	With halogen lamp	With solar energy
150	465	125	135
150	465	125	142
150	465	125	162

*Intensity of light in lux × 100.

laparoscope. On a bright, sunny day, if properly directed and focused, solar energy can be utilized for performing not only laparoscopic operations, but for any studies where optical fibre cables are used.

Population growth is a big challenge in our country, and family planning is highly prioritized by the Government of India. Sterilization is the most common voluntary contraceptive method, and has for many years been performed in camps. In the present study we have used solar energy as an illuminating light source for laparoscopic sterilization because in most of the remote areas there is poor and unreliable power supply. Further improvizations are possible, particularly during field camps, making arrangements for direct reading of the Lux meter and for the reflector and focusing lens to be attached to the laparoscope.

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Evaluation of progenies of candidate plus trees of *Pongamia pinnata* (L.) Pierre. for seed germination and seedling vigour

Pongamia pinnata (L.) Pierre. (family Leguminosae, sub-family Fabaceae) is one of the commercially important multipurpose tree species of India, and is popularly known as 'Karanj'. The species is found commonly in littoral and riverian forests of India[1]. It is considered as a multipurpose tree species due to its various uses like fodder, shade, biofuel, medicinal uses and for nitrogen fixing in agroforestry[2].

Recently, this species has been recognized for its high commercial value, where Karanj seeds are used for oil extraction in biofuel production (35–42%)[3]. Hence the National Oilseeds and Vegetable Oils Development (NOVOD) Board, Gurgaon, India, has initiated a tree improvement programme for tree-borne oil-yielding species (TBOs) in different states with a mandate for population identification, selection of superior genotypes and establishment of seed orchards to produce high-quality fruits/seeds for oil extraction.

Recently, the College of Forestry, Dr Balasaheb Sawant Konkan Krishi Vidyapeeth (DBSKKV), Dapoli, has initiated such work in the Konkan region, Maharashtra. Twenty candidate plus trees (CPTs) were selected in this region based on their superiority with respect to fruit yield, seed quality and oil yield. However, performance of progenies of such superior genotypes needs to be evaluated at different stages from the seedling stage to at least one-third of the rotation of that crop for morphological and reproductive characters like quality and quantity of fruit yield[4].

Progeny evaluation is one of the selection methods followed in tree improvement programmes, where superior genotypes are selected based on the performance of their respective progenies at an early age by providing similar environmental (growing) conditions to progenies of selected genotypes[5]. Individuals selected through this method are known to be superior with respect to their genetic characters. Hence, plus trees are generally graded as elite types based on progeny performance in progeny trials.

With this background, the present study was undertaken at DBSKKV during 2009–2010 to evaluate progenies of selected CPTs of *P. pinnata* for seed germination and seedling growth attributes.

The study area is situated on the west coast of Maharashtra at an altitude of 280 m amsl at 17°45′N lat. and 13°12′E long. in the subtropical region. Pods were collected from 20 CPTs selected by DBSKKV during 2008–2009 (ref. 6) and located in different regions of Konkan Maharashtra. Pods were spread separately on the floor under the shade for one week. Then the seeds were extracted and cleaned. Individual seed lot of different CPTs was sown on raised nursery bed covered with potting mixture consisting of soil, sand and farmyard manure (FYM) in the ratio 2 : 1 : 1 during July. This experiment was laid out in randomized block design with four replications having 100 seeds each. Watering and weeding were attended as and when required. Observation on daily germination count was recorded up to 45 days from the date of first emergence (Figure 1). Further, seedling growth parameters like seedling height, collar diameter, leaf area and number of leaves were recorded in the nursery bed at monthly intervals up to six months. For biomass estimation, eight seedlings from each CPT were uprooted from the nursery bed and these samples were washed in water to remove the soil completely from the root portion. Later, root growth parameters like tap root length, primary root length, number of primary roots and seedling biomass were recorded. Shoot and root vigour indices were calculated using standard formula. The data were subjected to statistical