

Effect of major nutrients on yield and quality of *Jatropha curcas*

VEENA N. KALANNAVAR*, S.S. ANGADI, V.C. PATIL, S.G. ANGADI, A.S. BYADAGI AND S.J. PATIL

Department of Agronomy, College of Agriculture, University of Agricultural Sciences,
DHARWAD (KARNATAKA) INDIA

ABSTRACT

A field experiment was conducted at the Main Agricultural Research Station (MARS), College of Agriculture, Dharwad to study the effect of major nutrients on yield and quality characteristics of *Jatropha* during *kharif* 2007-08. Results revealed that application of 100:100:150 kg N:P₂O₅:K₂O ha⁻¹ recorded significantly higher *Jatropha* seed yield (3937.50 kg ha⁻¹) over 150:150:150 kg N:P₂O₅:K₂O ha⁻¹ (2775 kg ha⁻¹) which was superior over control (875 kg ha⁻¹) and was at par with all other treatment combinations. Similarly, significantly higher physiological attributes like chlorophyll content (2.08 mg g⁻¹ fresh weight), shelling percentage (64.83 %), oil yield (1461.28 kg ha⁻¹) and biodiesel yield (1200.46 l ha⁻¹) were also recorded with 100:100:150 kg N:P₂O₅:K₂O ha⁻¹ which were superior over all other treatment combinations including control but oil content was significantly higher in control (40.07%) as compared to all other treatment combinations.

Key words : Major nutrients, *Jatropha*, Yield, Quality

INTRODUCTION

India is the second most populous country in the world and meeting its energy requirements in a sustainable manner continues to be a major challenge. The huge gap between demand and supply may be met by import. The net import burden was increased from Rs.1,01,963 crores in 2004-05 to Rs.1,50,557 crores in 2005-06 and taking into account, the average prices till now during the current year, the import bill for 2006-07 could be of the order of Rs.1,90,000 crores (Punia *et al.*, 2006). In this context, generating biofuels as potential energy sources for the future is the most logical step. Under Indian conditions, plants which produce non-edible oil in appreciable quantities and suitable for large scale cultivation in all kinds of soils, besides, waste lands can be considered for bio-diesel production. In India, plants like *Jatropha*, *Pongamia*, *Cimaraouba* spp *etc.* are known to produce bio-diesel and have wider adaptability. The work on these crops conducted elsewhere is meagre. Among the bio-diesel crops, *Jatropha curcas* is a large shrub able to thrive under different soil types and varied climatic conditions with the rainfall of 250-1200 mm. Seeds of *Jatropha* contain about 35-40 per cent of oil and kernels about 55-60 per cent and the average seed yield is about 60 to 80 q ha⁻¹ after 6 years (Gour, 2004). Despite its focus as an important economic biofuel crop, little is known about the nutritional requirement of *Jatropha*. Being an energy plantation, *Jatropha* may utilize large quantities of nutrients from soil itself and will definitely deplete soil fertility if not properly fertilized. It is, therefore, necessary to maintain soil fertility status for sustainable production of *Jatropha*. Hence, the present investigation was carried out to find out suitable dose of fertilizers and its effect on yield and quality attributes.

MATERIALS AND METHODS

A field experiment was conducted to study the effect of major nutrients on yield and quality of *Jatropha curcas* at the Main Agricultural Research Station, College of Agriculture, Dharwad during *kharif* 2007-08. The soil had pH 7.50, organic carbon 0.76 per cent and the available N, P₂O₅ and K₂O were 305, 31.3 and 346.6 kg ha⁻¹, respectively. The experiment was laid out in Factorial Randomized Block Design with three replications. There were 28 treatment combinations consisted of three factors with three levels of nitrogen (50,100 and 150 N ha⁻¹), three levels of phosphorus and potassium (100,150 and 200 kg P₂O₅ ha⁻¹) with an absolute control (0:0:0 kg N:P₂O₅:K₂O ha⁻¹). Ring basins were prepared all around each plant at radii of one and a half feet distance to facilitate better storage of water and efficient utilization of nutrients. Nitrogen, phosphorus and potassium were applied (in the form of urea, single super phosphate and muriate of potash, respectively) as per treatments around the basin at one feet distance from the trunk and common dose of 10 t ha⁻¹ FYM (Farmyard manure) was applied (0.4 kg FYM basin⁻¹) by ring method. Fertilizer and FYM were covered with soil. Nitrogen was top dressed as per treatments around the basin at one feet distance from the trunk and then covered with soil during second flush.

RESULTS AND DISCUSSION

Effect of NPK levels on quality parameters of Jatropha:

Chlorophyll content:

The leaf chlorophyll content (Table 1) is the key factor determining the rate of photosynthesis. Application of