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“Competition for Resources in a Changing World:  
New Drive for Rural Development”

***Artemisia annua* ANAMED, a Medicinal Plant for Malaria Treatment: A Study on Growth Performance and Artemisinin Content under Tropical Highland Conditions of SW Ethiopia**

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**Abstract**

Worldwide approximately 300 million people are affected by malaria. Previously extremely widespread, malaria is now mainly confined to Africa, Asia and Latin America. The problems of controlling malaria in these countries are aggravated by inadequate health structures and poor socioeconomic conditions. The situation has become even worse over the past years with an increasing resistance to the drugs normally used to combat the parasite causing malaria. Alternatives are therefore urgently required. *Artemisia annua* contains artemisinin in leaves and flowers, a sesquiterpene lactone effective against drug resistant malaria. The World Health Organisation (WHO) recommends an Artemisinin based Combination Therapy (ACT). A tea based therapy is also available, which is favoured by low income population as it is less expensive. A new strain – *Artemisia annua* ANAMED – adapted to tropical conditions was introduced to southwestern Ethiopia in 2001, a malaria prone area. This study aimed at assessing the growth performance of A-3 and changes of its artemisinin content as affected by environmental conditions. Therefore, field trials were established during October 2006 and July 2007 at three locations in the Gamo Gofa Highlands of SW Ethiopia. Sites varied in altitude, climate and soils. Artemisia performance was monitored by monthly collecting plant samples to determine plant growth and variations in artemisinin content. Artemisinin was determined by using the High Pressure Liquid Chromatographic (HPLC) method. Results indicated strong environmental impacts on crop growth, dry matter production and artemisinin synthesis. An altitude of 2,200 m a.s.l. with a minimum and maximum temperature of 17.3 and 24.5°C led to a better performance (dry leaves: 2.9 vs. 1.4–1.7 t ha<sup>-1</sup>; artemisinin: 1.07 vs. 0.57–0.91 %) than higher elevations (2,600–2,900 m a.s.l.) and lower temperatures (8.4/18.3 and 10.4/16.3°C). It was also observed that a lower but well distributed rainfall (480 vs. 850–1050 mm) found at the lower elevation was also favourable for artemisia growth. This information is valuable to identify potential sites suited for A-3 cultivation. Thus, it may foster its promotion in Ethiopia and other countries, leading to an improved health situation of the rural population in malaria prone areas and contribute to income generation for small scale farmers.

**Keywords:** *Artemisia annua*, artemisinin, crop growth, environment, malaria treatment, medicinal plant