

Decomposition and Nitrogen Release Dynamics of Fruit Tree Leaf Litters in Arid Western Rajasthan

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Abstract: Decomposition and nitrogen (N) release dynamics of leaf litters of *Citrus aurontifolia*, *Aegle marmelos* and *Cordia myxa* were studied from June 2010-April 2011 at Research Farm of Central Arid Zone Research Institute, Regional Research Station, Bikaner (Rajasthan). Among the three species, leaf litter of *C. aurontifolia* decomposed more rapidly followed by those of *A. marmelos* and *C. myxa*. About 51% of *C. aurontifolia*, 34% of *A. marmelos* and 21% of *C. myxa* litter disappeared in surface and 59% of *C. aurontifolia*, 36% of *A. marmelos* and 24% of *C. myxa* disappeared in buried condition within 60 days. The decomposition pattern of all the three species could be divided into two phases. The first phase (rainy season from June to November) showed a relatively faster decomposition rate (R) while the second phase (dry and cold season from November to April) showed relatively slower decomposition. The N release in both surface and buried condition followed the order *C. aurontifolia*>*Aegle marmelos*>*Cordia myxa*. The N release in *C. aurontifolia*, *A. marmelos* and *C. myxa* during the cropping season (July to October) was 54.1, 47.6 and 11.4% in surface applied litter and 70.5, 54.7 and 23.1% in buried condition, respectively. The slowest N release was observed in *C. myxa* due to its higher lignin content (45.5%) as compared to *C. aurontifolia* (19.8%) and *A. marmelos* (15.4%).

Key words: *Aegle marmelos*, *Citrus aurontifolia*, *Cordia myxa*, litter decomposition, nitrogen release.

In the arid ecosystem of north-western Rajasthan low and erratic rainfall, high temperature and dust storms in summer impose severe restrictions for arable cropping alone (Soni *et al.*, 2006). Growing of location-specific crops in combination with tree/grasses can increase resource use efficiency and replenish soil fertility (Gupta and Gupta, 1993; Soni *et al.*, 2007). From the last two decades, a great emphasis is being laid on the development of arid lands through agri-horti, agri-silvi models due to different rooting pattern of components for better utilization of moisture and nutrients. Citrus (*Citrus aurontifolia*), bael (*Aegle marmelos*) and gonda (*Cordia myxa*) are some of the potential fruit trees species under agri-horti systems in partially irrigated arid situation. The foliage biomass produced by these species enhance soil fertility by recycling the nutrients through litter fall, pruning or importing nutrients through biomass transfer systems (Mafongoya *et al.*, 1998). Intensive studies on litter dynamics in forest ecosystems have been carried out worldwide (Whitford, 2002; Kemp *et al.*, 2003; Yahdjian *et al.*, 2006, Bolxhelm *et al.*,

1991). But the litter decomposition of fruit tree species grown in farm fields have not received due attention. Currently, no information is available on the litter decomposition of *C. aurontifolia*, *A. marmelos* and *C. myxa*, the three potential fruit tree species of agri-horti systems of western Rajasthan. Hence, the present experiment was carried out to study the litter decomposition and N release pattern of leaf litter of *C. aurontifolia*, *A. marmelos* and *C. myxa* under field conditions.

Materials and Methods

The study was conducted from June 2010 to April 2011 at Research Farm of Central Arid Zone Research Institute, Regional Research Station, Bikaner, India (latitude 28.03°N, longitude 73.19°E) in an agri-horti system consisting of three fruit trees (*C. aurontifolia*, *A. marmelos* and *C. myxa*) grown under drip system with clusterbean as rainfed intercrop. The average annual rainfall of the region is 275 mm with 57% coefficient of variation. Mean monthly maximum and minimum temperature ranged from 21 to 43°C and 6 to 29°C, respectively, in which the mercury touches 47°C in summer and dipping down to freezing point in winter.

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