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Studies on Physiological Maturity in *Phyllanthus amarus* Schum and Thonn

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ABSTRACT The field and laboratory studies on maturity in *Phyllanthus amarus* were carried out at the Gandhi Krishi Vignana Kendra, University of Agricultural Sciences, Bangalore during *rabi* 2002. The results of the study indicated that the seeds *of Phyllanthus amarus* attained maximum dry weight (136g) at 53-55 days after anthesis (DAA). At this stage fruits turned to brown colour with moisture content of around 27.65 per cent and seed germination (88%) and vigour index (625) were also found to be highest indicating crop attained physiological maturity. For seed purpose under Bangalore condition the *Phyllanthus amarus* needs to be harvested around 55 days after anthesis.

Key words: *Phyllanthus amarus*, physiological maturity, seed germination, medicinal plant

Phyllanthus amarus is an important medicinal plant commonly known as Bhumyamalaki or Kizhanelli or Bhuiamla belongs to family Euphorbiaceae (Spurge family), widely used for the treatment of jaundice, kidney and urinary bladder ailments, diabetes and dreaded hepatitis 'B' virus. It is being cultivated in Tamil Nadu, Karnataka, Uttar Pradesh and parts of Assam, West Bengal, Tripura, Haryana and Gujarat. At present the seed production in this crop is not being carried out in a systematic manner including the time of harvest. In order to fix the optimum stage of harvest, the present study was undertaken to understand the development and maturation of seeds, so that the fruits can be harvested at right time to get higher seed yield and quality.

METERIAL AND METHODS

Phyllanthus amarus seed crop was raised during *rabi* 2002 at Sanjeevini Vatika, Division of Horticulture, University of Agricultural Sciences, Bangalore. For the study purpose, around 400-500 flower buds of equal age in a net plot based on appearance and size were tagged. Samples of fruits were drawn from the tagged flower buds, starting from 15 days after anthesis till maturity at 5 days interval in the beginning and at 2 days interval nearing maturity. At each sampling 10 fruits in each plot were harvested to estimate the fresh and dry weight of seeds. The seeds were dried at 103°C for 17 h and then samples were taken out from the drying chambers, cooled to room temperature and their dry weight was recorded. Each plant produced nearly 4 to 4.5g of seeds. From the primary data, moisture percentage was computed on wet basis. Simultaneously 10 more developing fruits were collected at each sampling. The fruits were hand shelled and seeds obtained were dried under shade to reduce seed moisture content to around 12 per cent and were subjected to laboratory germination on top of the paper at 25 ± 0.5°C since species is small seeded one [1]. The final seed germination was recorded on 12th day. The process of sampling, determination of seed dry weight and germination were continued till the seeds attained complete maturity.

RESULTS AND DISCUSSION

The results obtained from maturity studies showed that under Bangalore condition, the seeds of

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Phyllanthus amarus attained physiological maturity around 55 days after anthesis (Table 1 and Fig. 1). The fresh weight of 1000 seeds reached a maximum of 190 mg at 51 days after anthesis, thereafter declined steadily. The reduction may be attributed to decrease in moisture content of seeds and simultaneous increase in the dry weight of seeds. The dry weight of seed was maximum (136mg/ 1000 seeds) at 55 days after anthesis indicating that the seeds attained physiological maturity at 55 days after anthesis, which was accompanied by change in pod colour from green to brown. Thereafter the dry weight was either constant or decreased marginally indicating no translocation of nutrients from mother plant to the seed. Similar trend was noticed in senna and marigold [2, 3].

The moisture content of the developing seeds decreased gradually with increase in the days after anthesis. It was 77.8 per cent at 15 days after anthesis and decreased to 27.65 per cent at 55 days after anthesis that could be considered for physiological maturity. Kalavathi *et al.* [4] have also observed similar trend in seed moisture content in senna seeds under Coimbatore condition.

The germination of seeds in *Phyllanthus amraus* started at 40 days after anthesis with just 25 per cent and reached maximum (88%) at physiological maturity (55 DAA) and thereafter there was slight reduction. Similarly, root and shoot length (2.3 and 4.8 cm) and vigour index (625) were also maximum at physiological maturity which indicated that seeds put up maximum dry weight and possess

Table 1. Effect of different stages of picking on seed quality in Bhumyamalaki (*Phyllanthus amarus*)

Stages of picking (DAA)*	Fresh weight of 1000 seeds (mg)	Dry weight of 1000 seeds (mg)	Moisture content of seeds(%)	Germination (%)	Root length (cm)	Shoot length (cm)	Vigour index
15	158	35	77.80	0.00	0.00	0.00	0
20	162	50	70.88	0.00	0.00	0.00	0
25	164	60	63.41	0.00	0.00	0.00	0
30	168	68	59.52	0.00	0.00	0.00	0
35	170	80	52.94	25.00	0.60	1.00	40
40	175	90	48.75	30.00	1.50	2.50	120
45	178	100	48.32	50.00	1.60	2.60	210
47	182	100	39.43	68.00	2.00	3.00	340
49	185	125	32.43	75.00	2.10	3.30	405
51	190	132	30.52	82.00	2.20	3.40	451
53	188	135	28.19	85.00	2.20	4.10	535
55	188	136	27.65	88.00	2.30	4.80	625
57	185	135	27.02	87.00	2.30	4.60	600
59	182	134	26.08	85.00	2.20	4.50	569
Mean	176	81	45.21	44.64	1.35	2.41	278
SEm±	1	1	1.03	1.38	0.07	0.12	8
CD (P=0.05)	3	4	3.00	4.03	0.21	0.36	24

*DAA-Days after anthesis; VI=Germination (%) x Mean seedling length (cm)

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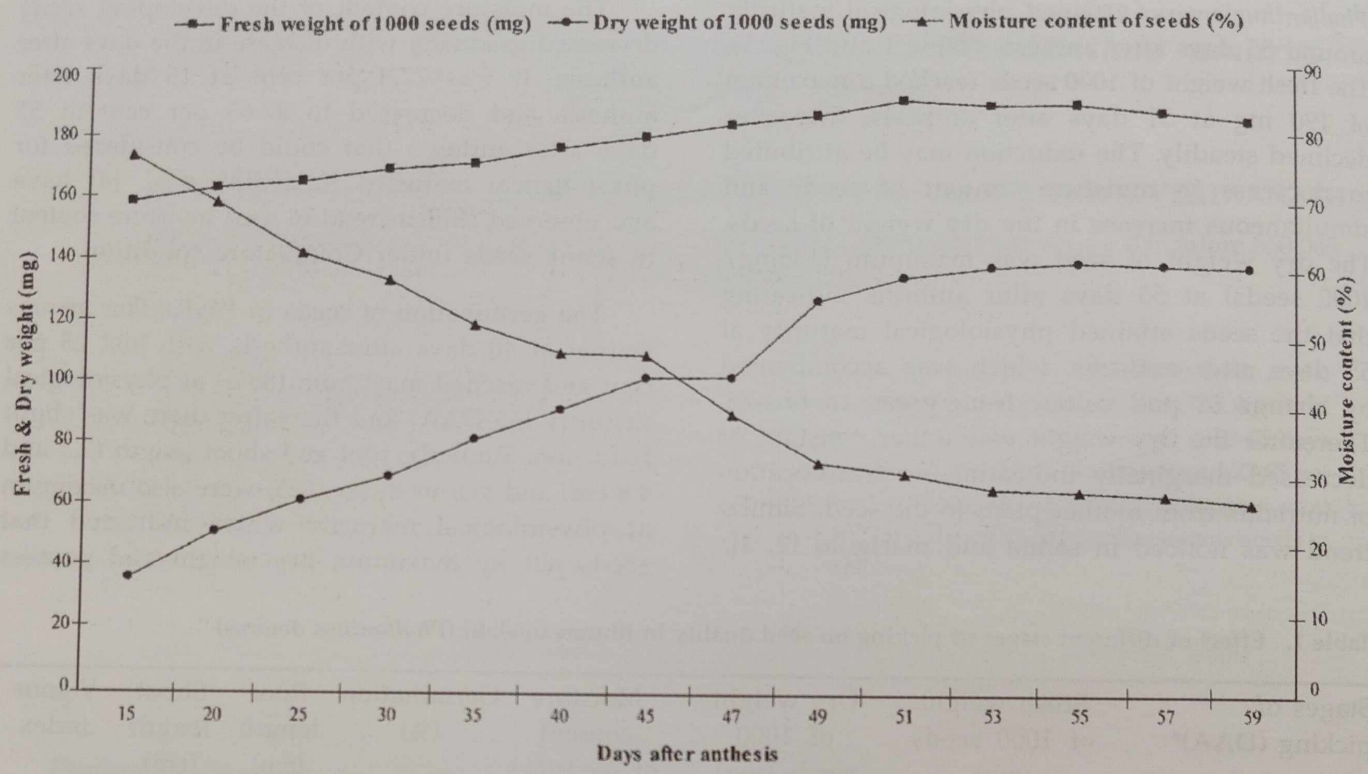

Fig. 1. Course of seed development, dry matter accumulation and moisture content in the seeds of *Phyllanthus amarus*

maximum viability and vigour at the stage of physiological maturity. Similar results were also obtained by earlier workers in the seeds of brinjal and chilli [5, 6]. Thus from the study, it is concluded that the *Phyllanthus amarus* may be harvested at 53 to 55 DAA as the seeds harvested at this stage recorded better quality parameters and higher seed yield (477kg/ha).

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