

## EFFECT OF AGE OF SEEDLINGS ON GROWTH AND YIELD OF TRANSPLANTED MAIZE

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### ABSTRACT

A field experiment was conducted at the Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore to standardise the age of seedlings and to evaluate the yield potentials of transplanted crop with direct seeded ones in maize during *kharif* 86 and *rabi* 86-87. Five and ten day old seedlings raised from conventional soil nursery were compared with direct seeding. The grain yield increase with 5-day old seedlings was by 8 q/ha (14.7 per cent) and 6 q/ha (11.5 per cent) during *kharif* and *rabi* respectively over the direct seeded crops. There was deep decline in grain yield when 10-day old seedlings were transplanted. The highest net return of Rs. 6610 and Rs. 5503 was realised with 5-day old seedlings against Rs. 5339 and Rs. 4566 under direct seedling respectively during *kharif* and *rabi* seasons. The return per rupee invested was Rs. 2.67 and 2.39 with 5-day old seedlings as compared to 2.36 and 2.16 with direct seeding respectively for both the seasons. The method of raising nursery is also furnished.

*Keywords* : Maize, Age of seedling, Growth, Yield

Maintenance of optimum plant population is one of the major factors in deciding the productivity of a crop which is solely dependent on the emergence of seedlings from the seeds placed in the soil. The emergence of maize seedlings has been reported to be frequently impaired by the presence of excess salt in the soil, higher clay content, of the soil and crust formation on the surface soil. These problems could be alleviated by resorting to frequent irrigations, mulching and application of soil amendments like gypsum (Chaudri and Das, 1978 and Hazar, 1986). Transplanting of seedlings is usually practised in small seeded crops. However, transplanting has been successful in large seeded crops like cotton with seedlings raised from *dapog* nursery (Gopaldasamy, 1982). The present study was taken up to standardise the age of seedlings raised from soil nurseries and to evaluate the yield poten-

tials of transplanted crop against direct seeded ones at the Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore.

### MATERIALS AND METHODS

A preliminary microplot trial was conducted to assess the extent of establishment of 5, 10 and 15-day old seedlings. The establishment of seedlings in the main field was 100 per cent with 5-day, 85 per cent and 35 per cent with 15-day old seedlings. The five day and 10-day old seedlings were included in treatments of the main experiment. The experiments were conducted during *kharif* 86 and *rabi* 86-87.

The treatments consisted of five methods of irrigation and two ages of seedling (5 and 10 days) and a direct seeding. The treatments were tried in split plot design with the irrigations in the main plot and the ages of

seeding in the subplot with three replications. The soil type of the experimental site was clayloam (*kharif*) with a clay content of 30.5 per cent and sandyloam (*rabi*) having 15.2 and 22.8 per cent of clay and silt respectively. The soil pH was 8.4 and 8.2 and the nutrient status in both the sites was low in available N and phosphorus and high in potassium. The crop variety Co1 maize was used with a spacing of 60 x 20 cm and a fertilizer schedule of 125 : 62.5 : 50 kg N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O/ha was adopted.

The following nursery techniques were adopted. A total area of 5 m<sup>2</sup> was required to transplant one hectare of main field with a seed rate of 12.5 kg/ha. Raised beds (5 cm) were formed and well decomposed farmyard manure (Fym) sand mixture (1:1) was spread to a thickness of 3 cm over the levelled soil bed. The seeds were placed compactly, pressed gently and covered with Fym-sand mixture to a thickness of 2 cm. The beds were watered twice daily for 3 days with rose can. The seedlings were lifted by disturbing the medium and transported to the main field through baskets. Advance nurseries were raised to supply 10 and 5-day old seedlings for transplanting in a specific date along with direct seeding. The effect of irrigation treatments is not discussed in this paper.

## RESULTS AND DISCUSSION

### Grain yield

During both the seasons of the investigation, transplanting with 5-day old seedling produced significantly higher grain yield than direct seeded and the crop transplanted with 10-day old seedlings. The grain yield increase with 5-day old seedling was more by 8 q/ha (14.7 per cent) and 6 q/ha (11.5 per cent) during *kharif* and

*rabi* respectively over the direct seeded crop (Table 2). The yield increase was more by 23 and 18 q/ha respectively during *kharif* and *rabi* over the 10-day old seedlings. The significant increase in grain yield with 5-day old seedling was due to increased plant height, leaf area, index, dry matter accumulation, root growth and nutrient uptake (Table 1). The increase in growth characters promoted the yield components such as cob length, cob diameter and the number of grain per cob (Table 2). On the other hand, in the case of 10-day old seedlings, greater reduction in grain yield was because of reduction in growth and yield components. This was due to the "Transplanting shock" and consequential time lag in the establishment. On the contrary, such time lag in the establishment of seedlings with 5-day old seedling was not observed, because of continued availability of nutrients from the cotyledons of the seeds till the seedlings became nutritionally independent. In addition root snapping was also less as compared to 10-day old seedlings. Similar steep declines in grain yield with transplanting of aged seedlings due to reduction in yield components were observed in sorghum (Gopikrishnan, 1987) and in cotton (Gopalasamy *et al.*, 1985).

### Stover yield

During both the seasons of the study the 5 day old seedlings produced higher stover yield (Table 2) as compared to the direct seeding and 10-day old seedlings. The increase was due to better development of growth components with 5-day old seedlings.

### Economics

The highest net return, per rupee invested was realised from the crop transplanted with 5-day old seedlings as compared to direct seedin

Table 1: Effect of age of seedling on growth components and uptake of nutrients

Season	Kharif 86					Rabi 86-87				
	DS	5-day	10-day	SEd	CD(5%)	DS	5-day	10-day	SEd	CD(5%)
Plant height (cm) at harvest	287.7	309.3	242.0	5.4	11.2	240.5	272.7	208.9	3.1	6.3
Leaf area index (silking)	5.9	6.9	4.8	0.25	0.51	5.2	5.8	4.4	0.24	0.5
Dry matter duration at harvest (kg/ha)	191.4	216.7	149.2	7.9	16.50	168.1	190.4	128.9	9.30	19.4
Root length (cm)										
30 days	—	—	—	—	—	15.4	20.3	8.5	0.33	0.68
60 days	—	—	—	—	—	42.6	45.8	34.8	1.36	2.83
Nutrient uptake (kg ha <sup>-1</sup> ) at harvest										
Nitrogen	250	292	202	4.5	9.3	228	258	174	5.4	11.3
Phosphorus	38	43	30	1.5	3.1	34	38	26	1.1	2.3
Potassium	214	242	167	2.7	5.7	188	213	144	4.1	8.6

DS = Direct seeding; 5 day = Five day old seedling; 10 day = Ten day old seedling

Table 2. Effect of age of seedling on yield components, yield and economics

Season	Kharif 86					Rabi 86-87				
	DS	5 day	10 day	SEd	CD(5%)	DS	5 day	10 day	SEd	CD(5%)
Cob length (cm)	20.0	23.5	15.7	1.0	2.15	19.5	22.2	14.1	0.71	1.49
Cob diameter	4.6	5.2	3.7	0.23	0.49	4.44	4.9	3.9	0.21	0.43
No. of grains/cob	423	502	295	11.20	23.30	416	496	290	14.50	30.30
Grain yield (q/ha)	52.48	60.22	37.31	0.65	1.35	48.62	54.20	36.74	0.606	1.26
Stover yield (q/ha)	133.39	156.55	111.88	2.72	5.68	119.53	136.24	92.15	2.561	5.35
Net return	5330.00	6610.90	2727.00	97.56	203.50	4566.00	5503.84	2444.00	143.14	298.60
Return per rupee invested (Rs.)	2.36	2.67	1.69	—	—	2.16	2.39	1.62	—	—

and 10-day old seedlings. The higher increased nursery cost of Rs.50/ha was very well compensated by the enhanced monetary return with five day old seedlings.

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