ALTERNATIVE PROPAGATION TECHNIQUES FOR PRODUCING TEXAS FIELD ROSE BUSHES[1]

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Abstract. New techniques are needed to produce Texas field rose bushes more efficiently A high percentage of successful bud unions was obtained by bench chip budding dormant roses with either a conventional budding knife or Liliput tool Bench chip budding and utilizing selected forcing techniques to overcome initial dominance of understock axillary buds may help reduce the two year production period for producing field roses

New techniques are needed to produce field rose bushes more efficiently (2). In Texas field roses are conventionally produced over a 2-year production cycle under dry-land farming conditions utilizing the T-bud method (Table 1). T-budding requires active cambial division, which causes the understock bark to "slip" (3). During dry springs and early summers T-budding success is diminished since irrigation is not commonly utilized. Furthermore, only 50 to 85% of the initial field-planted *Rosa multiflora* hardwood cuttings successfully develop into a marketable bush. In addition field roses are individually handled some 20 to 25 times during their 2-year production cycle.

Table 1. Two Year Rose Bush Production Cycle — East Texas

Nov , 1981-Jan , 1982	Multiflora hardwood cuttings placed in field for rooting
March-July, 1982	T-budding of multiflora understock with budwood collected and stored from late fall, 1981
Oct -Dec , 1982	Breaks from multiflora understock used as hardwood cuttings
Jan -Feb , 1983	Scion budwood, which forced during previous season, is cut back before *R. multiflora* is cut back by machine in order to prevent scion damage
Feb -March, 1983	Budded multiflora understock cut back by machine to encourage scion bud break
Oct -Dec , 1983	Rose bushes pruned for budwood and later dug and processed for storage and shipment

It is possible for a grower to have 3 generations of roses at one time
a) 2 yr rose bushes which have yet to be dug in the fall
b) 1 yr rose bushes which were T-budded in the spring
c) *R multiflora* understock cuttings which have just been planted in the fall

Many nurserymen believe that a more hardy rosebush is produced in East Texas than in other parts of the country,

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since *R. multiflora* is used as the principal understock and the cooler climatic conditions of the fall and winter allow for a more natural dormancy and transplanting survival. Clearly, production efficiency must improve if the Texas rose industry is to remain economically viable into the 1980's.

MATERIALS AND METHODS

Experiment 1. To characterize bench chip-budding of roses grown under commercial conditions of East Texas, a 2×2×2 factorial randomized complete block design was initiated in December. Chip budding 'Blaze' and 'Climbing White American Beauty' budwood onto dormant 'Brooks 56' were compared between a Liliput budding tool (J.E. Heitz, Inc., St. Helena, Calif.) and a conventional budding knife. Either parafilm strips or conventional rose budding rubbers were used to wrap grafts. Fifteen grafts in each of the 8 treatment configurations were replicated 5 times. Budded cuttings were stored in a dark growth chamber at 24°C for 1 week in polybags containing moist sphagnum, then planted under field conditions in East Texas.

Experiment 2. Since field rose bush producers leave 2 to 3 distal axillary rootstock buds for future understock propagules, the influence of 0-2 rootstock axillary buds on grafting success was examined. Information obtained could aid commercial growers in determining the feasibility of establishing permanent stock blocks instead of relying on each rose bush generation for new propagules. Hence, with a permanent source of propagules from stock blocks, bench chip budded scions might develop more rapidly since there would be less competition from 0-2 rootstock axillary buds.

One-year-old dormant *Rosa hybrida* 'Mirandy' budwood and shoots of *R. multiflora* 'Brooks 56' were collected from commercial fields of East Texas in December. Rootstock shoots with diameters greater than 4 mm were cut into 20 cm long cuttings. Each dormant 'Mirandy' scion was bench chip-budded to the medial position of unrooted rootstock cuttings with a Liliput budding tool (J.E. Heitz, Inc.) Chip-budded scions were subsequently wrapped with a one layer 1.7×12.5 cm Parafilm (American Can Co.) strip, which left the bud apex partially exposed (1).

Unrooted dormant bench-budded grafts were then inserted into Jiffy trays (Ball Seed Co.) containing steam-sterilized blasting sand (Bryco #2) as a rooting medium and placed underneath a greenhouse bench. Seventeen days later all trays were moved to the top of a greenhouse bench under shade. Shade was removed after one week.

Rooted grafts were transplanted 55 days after planting to sterilized 6.4 × 25.4 cm black plastic Deepots (McConkey and Co., Inc.), which contained 600 ml of 2 peat moss: 1 vermiculite: 1 perlite (v/v). Rootstock tops were pruned off at 1 cm above the chip bud 68 days after budding to enhance scion growth.

The three treatments in this experiment consisted of: a) all rootstock lateral buds removed, b) one rootstock lateral bud left at the distal end, and c) two lateral buds left on the distal rootstock cutting prior to chip budding. There were 20 grafts per treatment, which were replicated 4 times. The length of rootstock lateral shoot(s) and scions was recorded. Root quality of rootstocks was compared with a scale of 1 to 5 sixty-five days after chip budding.

RESULTS AND DISCUSSION

In Experiment 1 successful bud unions occurred with both the Liliput budding tool and hand budding techniques (Table 2). Poorer responses occurred with hand chip budding of 'Blaze' budwood, which may have been due to smaller bud pieces used; it has been our observation that 2 to 3 cm bud pieces are more effective in chip budding of dormant rose understock. Parafilm was more effective than budding rubbers traditionally used by growers, possibly due to reducing desiccation and acting as a protective barrier (Table 2). Some girdling and tissue necrosis occurred with budding rubbers, since grafts were buried under the soil and budding rubbers were not subjected to ultraviolet light breakdown, which normally happens with above ground conventional T-budding system.

Table 2. Effect of bench chip budding by hand and by Liliput budding tool using Parafilm strips or budding rubbers when budding 'Blaze' and 'Climbing White American Beauty' to 'Brooks 56' *R. multiflora* understock

Treatment		Bud union (percent)	
		'Blaze' bud	'Climbing White American Beauty' bud
Budding method	Wrapping material	Rootstock 'Brooks 56'	Rootstock 'Brooks 56'
Hand	Parafilm	87a[y]	93a
	Budding rubber	67b	67b
Tool	Parafilm	93a	87a
	Budding rubber	80a	67b

[y] Mean separation within column by Duncan's multiple range test, 5% level

Bench chip budding (2) has potential advantages of eliminating production steps since cutting switches, de-eying cuttings (removing lower buds to prevent suckering), and budding

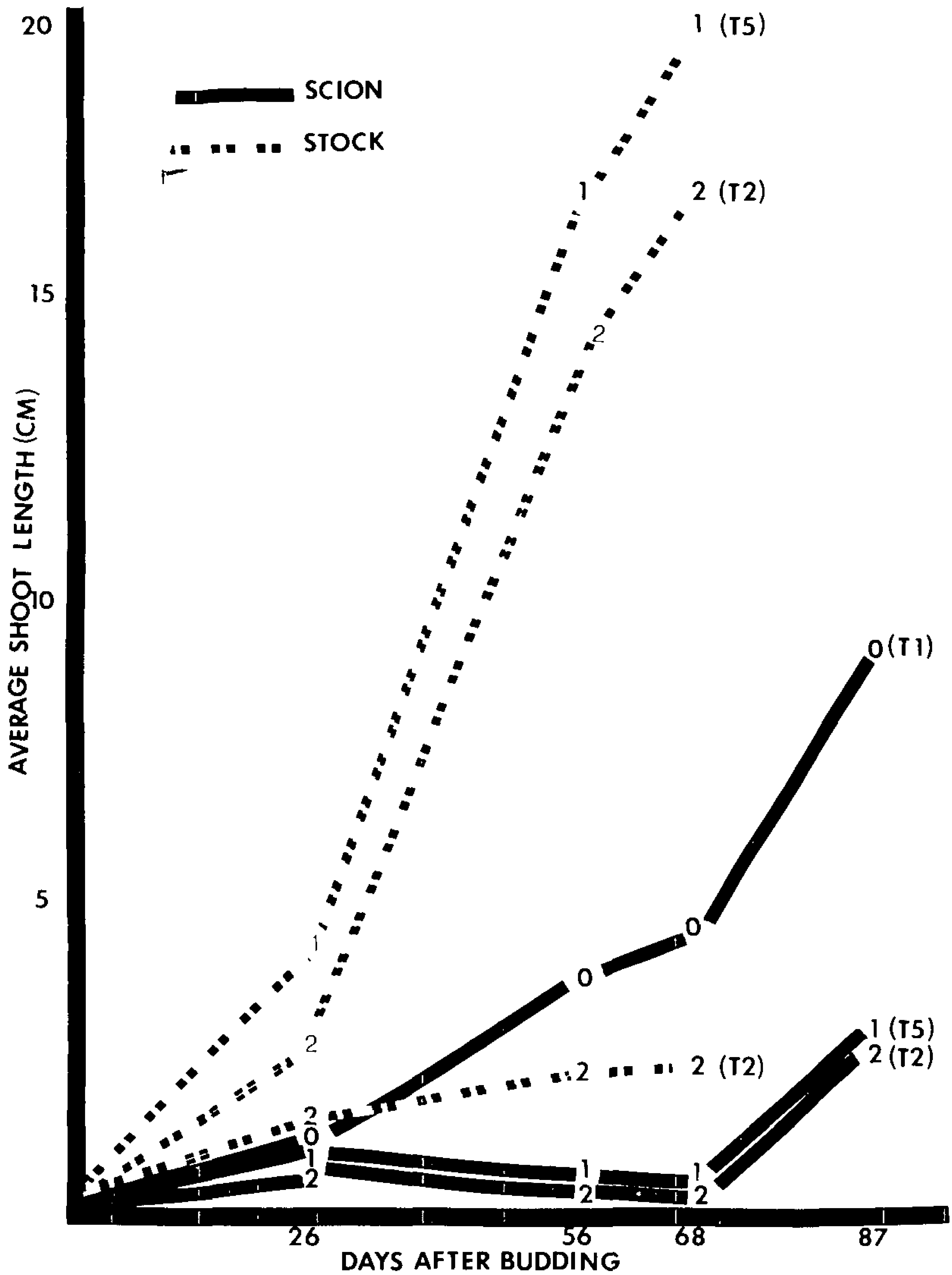

Figure 1. Growth curves of 'Mirandy' scions and 'Brooks 56' rootstock lateral shoots of treatments T1 (no lateral bud left at the top of each rootstock, represented by 0), T2 (one lateral bud left at the top of each rootstock, represented by 1) and T3 (two lateral buds left at the top of each rootstock, represented by 2)

can be done at the same time indoors during the "downtime" of winter. Time and discomfort to the worker could be reduced as he would bud on a bench rather than in the field, as is done with conventional T-budding. Other advantages of bench chip budding are. (1) elimination of T-budding seasonality due to its dependence on active understock cambium, and (2) reduction in the growth cycle since a 3 to 6 month advantage may be gained in the development of the scion.

In Experiment 2, the growth rate of 'Mirandy' scions chip-budded onto rootstocks without any lateral buds (Trt 1) was better than that of chip buds budded onto rootstocks containing one (Trt 2) or two (Trt 5) lateral buds. After pruning the top of all rootstocks at 68 days, a large increase in the growth rate of chip buds occurred (Figure 1). The lateral bud at the top of each rootstock of Trt 2 and one of two lateral buds at the top of each rootstock of Trt 5 became the dominant shoot as indicated by their growth rate. No differences occurred between Trt 2 and Trt 5 in the length of the dominant shoot, and the inhibited lateral shoot of Trt 5 had minimal development. There were no differences in the growth of chip buds budded onto rootstocks with one or two lateral shoots. After pruning rootstocks, scions grow vigorously.

Axillary buds on rootstocks prevent the development of chip-budded scions, which may be caused by the downward transport of inhibitors produced from the dominant shoot (4). Pruning rootstock tops 68 days after chip budding promoted vigorous axillary scion bud growth and consequently broke apical dominance

Root quality of rootstocks with one or two lateral shoots at their tops were superior to rootstocks with no lateral shoots. From experimental observation, it was found that rootstock cuttings of roses usually rooted after partial shoot elongation, suggesting that the shoot system provided growth substances required for root system development. Therefore, for commercial field rose bush production it is best to bench chip bud to rootstocks containing 1 or 2 axillary buds to encourage desirable root system development. Pruning must occur early in the growth cycle to eliminate dominance of rootstock lateral buds and allow for maximum scion development to shorten the production time.

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FIELD ROSE PRODUCTION

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Rose plants have been produced in east Texas for many years where the acid, sandy soil and rainfall are favorable for production of roses as a field crop. It is important that the fields be well-prepared. We begin field preparation in 1981 for the 1983 season.

It takes over 2 years to produce a salable rosebush. The production cycle begins in early November with cutting the budwood from desired cultivars. We use plants that will be dug and marketed this year. The mature wood is deleafed, wrapped in freezer paper, and then in damp newspaper, placed in plastic bags, and stored at 28°F until time to be used next May.

Next, the switches of rootstock are cut from the field that was budded this last year The switches are sawed into 6-inch long cuttings, de-eyed (lower eyes cut out leaving only 3 eyes on the top portion of each cutting), placed in bundles of 100, and put into large plastic bags for storing at least 2 weeks at 34°F before planting. In January, the cuttings are planted along the center of the rows that have been bedded up previously in the prepared field.

As the cuttings put on growth in the spring some of the bed is knocked down and, in May or later, depending on the growth rate and moisture in the soils and plants, the cuttings are T-budded with the desired cultivar buds that have been previously stored. The budsticks are removed from cold storage, slowly defrosted, and completely dethorned before being used in budding.

The field is cultivated and weeded all during the growing season but is not fertilized or sprayed (understock is quite resistant to blackspot and mildew.) That fall switches are cut from the understock plants to start the next crop.

The following February or early March, the understock