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Production Analysis of Budded Rubber Stumps in Rubber Research Institute of Nigeria (RRIN)

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ABSTRACT The study analyzed production of rubber budded stumps at the main nursery of Rubber Research Institute of Nigeria (RRIN), Iyanomo Benin City, Nigeria. Data were collected from 1996 – 2006 budding records to determine challenges facing the production of different clones of rubber by the Institute and suggest ways to increase the production and distribution of the high yielding RRIN developed rubber clones to farmers in Nigeria. The data were analyzed using descriptive and inferential statistics. The results showed that RRIN, under the period of study, produced more rubber seedlings from the exotic clones compared to the RRIN developed rubber clones though they have been found to be of higher yield (>2000 kg DRC/ha/year). The Institute relies much on raining seasons for its budded stump production. The study suggested the use of irrigation and biotechnology for higher quantity all year round production of rubber planting materials in the Institute.

INTRODUCTION

Natural rubber (*Hevea brasiliensis)* was introduced into Nigeria from Kew gardens, England in 1895 and has become increasingly important since the beginning of the 20th century. *Hevea* belongs to the family *Euphorbiaceae*. Most planted rubber is grown between 15^{0}N and 10^{0}S where the climate is humid with temperatures ranging from 23 to 45^{0}C and well distributed rainfall of 1800 mm to 2000 mm on a well drained soil (Aigbekaen et al. 2000; Omokhafe and Nasiru 2004).

Natural rubber production in Nigeria is mainly by small-scale farmers (Delabarre and Serier 2000). In order to diversify the nation's monoculture economic trend with heavy dependence on crude oil, the Federal government of Nigeria introduced programmes such as the National Accelerated Industrial Crops Production Programme (NAICPP) to promote the large-scale production of industrial crops such as rubber, cocoa, oil palm and Gum Arabic and the recent presidential initiative on natural to achieve the stated objective. Government funding of research for natural rubber resulted in remarkable improvements in the breeding of high yielding clones of rubber by the Rubber Research Institute of Nigeria (RRIN). RRIN adapted (exotic) clones and RRIN developed clones have latex yield of 900 to 1600 and 2000 to 3000 kg per hectare per year respectively (Alika 1982; Omokhafe and Nasiru 2004).

There has been an increasing demand for rubber and its products worldwide, but productivity seems to be inadequate to supply the growing demands. This may be attributable to a number of constraints. These constraints of the rubber industry are associated with the following among others: estate and smallholder development activities, seedlings production and processing. Most plantations are planted with unselected planting materials. Rubber seedling production and uptake is another area where few agencies are presently involved in raising certified rubber seedlings, insufficient certified planting materials, unorganized/ uncoordinated seedling production and uptake; inadequate trained man power in budding techniques; decreased earnings from rubber business and poor seedlings uptake. Giroh et al. (2007) identified inadequacy of planting materials as one of the major factors of the Nigerian rubber industry where demand – supply ration of 1: 3 was observed. The implication was that farmers resorted to using seedlings instead of budded stumps thereby resulting to low yield.

Recently, Federal Government of Nigeria introduced the presidential initiative on natural rubber to address the problem of the rubber industry in the country with specific view to address areas such as increased production of rubber through rehabilitation of old plantations and establishment of new rubber plantations in order to achieve the targeted expansion of hectarages under rubber cultivation (360,000 ha over a 12-year period, 2006 – 2018), yield improvement using improved clones and addressing both technological and socio – economic constraints militating against increased pro-

ductivity of rub-ber. The seedling required for targeted 360,000 hectare is about 180,000,000 certified rubber seedlings. This was designed to cover rubber growing States of Nigeria which include Delta, Edo, Abia, Imo, Rivers, Akwa Ibom, Cross River, Bayelsa, Anambra, Oyo, Ondo, Ogun, Taraba, Ebonyi, Osun, Ekiti, and Kaduna. To meet the presidential target on rubber therefore, certified seedlings production becomes a significant factor.

The improvement in the genetic characteristics with emphasis on the higher yield of rubber started in RRIN in year 1961. Mekako (1983) reported that both local and exotic clones imported from Malaysia and Sri Lanka (RRIM 600, RRIM 501, PB 28/59, PB5/63, RRIM 628, RRIC 45, RRIM 614, AVROS 1581, RRIM 605 and PB 5/51) were budded and selected for the desired traits. The clones were evaluated for higher yield, and a few with mean yield of 900 – 1600kg/ha/yr were recommended for farmers in Nigeria. These clones formed the parent stock for hybridization in RRIN. According to Alika (1982) and Mekako (1983), the first selection from the budded seedlings commenced in 1965, and six clones were selected which had yields of 2000 – 2600 kg/ha/yr. This first selection was certified in 1980 hence was coded NIG 800 series, while the second selection in 1990 was coded NIG 900 series with clones that can yield between 3000 – 3500 kg/ha/yr (RRIN 1983, 1995).

Inter-location trials of NIG 800 and NIG 900 series were established at Akwete (Abia State), Calabar (Cross Rivers State) and Okho in Edo State and the results have been very encouraging (Onokpise et al. 1996). The level of successes recorded in these budding programs yield improvements and other good secondary characteristics of RRIN developed clones. It is expected that plantation establishments in Nigeria today should be dominated by these Nigeria developed clones. However, the next question is how well has RRIN succeeded in the production and distribution of these RRIN developed clones that are high yielding with some good secondary characters?

This study was therefore conducted to evaluate: (1) total production of budded rubber stumps on clonal basis between 1996 – 2006, (2) the comparative production of RRIN developed and exotic clones in the Institute during the period under study, and (3) to suggest possible ways to increase production and distribution of RRIN developed clones to farmers in Nigeria.

MATERIALS AND METHODS

The experiment was conducted at RRIN Iyanomo near Benin City Southern Nigeria from 1996 – 2006. Iyanomo is located between longitudes 5°00'E and 6°00'E and latitude 6°00' and 7°00'N. The area is hot and humid and has the bimodal rainfall pattern. The mean annual rainfall for the past seven years was 2602.9mm. The soil is acidic (5.82 pH), medium level of organic carbon and total nitrogen 1.5 – 2.82 g/kg. Percentage phosphorus was 6.55 mg P/kg soil.

Both ground and polythene bags nursery techniques were used for the seedling production. Seeds for the production of seedlings were collected from plantation of good rooting and high soil diseases resistance characters, the seeds were pre-germinated in the pre-nursery. The budding procedure adopted in the Institute is as described by Delabarre and Serrier (2000).

The data were generated from field records between the years 1996 and 2006 in the Nursery Unit of RRIN. Field operations of the budders in the nursery were also observed within 2006 budding session. Budders and supervisors were interviewed and their comments noted. The data were analyzed using descriptive statistics such as means, percentages and bar charts using SPSS computer package.

RESULTS AND DISCUSSION

Cloned Production of Rubber Seedlings (1996 – 2006)

Table 1 presents the trend in budded rubber production during the period under study. The result shows that GT1 clone had the highest number of successful budding followed by NIG 800 series and RRIM series. These gave percentage values of 24%, 21% and 19% respectively of the total budded clones produced during the period of study. The lowest number of budded clone produced was the NIG 900 series which represents 4% of the total number of stumps produced stumps in the eleven years of study. Comparative analysis of the production of RRIN developed and exotic rubber clone in the nursery showed that 75% (600,257) of the budded stumps produced between 1996 – 2006 were exotic clones, compared to 25% (199,348) of the RRIN developed clones (NIG series) rubber clones

Table 1: Production of budded stumps in RRIN main nursery at Iyanomo (1996 - 2006)

Clone	*No. of Budded Stumps Produced*											
	1996	*1997*	*1998*	*1999*	*1998*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*
2NIG 800	2158	3230	809	1915	2559	2369	1945	211	309	0	0	15505
NIG 801	756	7007	4203	3057	1224	2188	4635	776	489	0	0	24335
NIG 802	0	702	2173	5178	0	4711	2446	2175	176	172	0	17733
NIG 803	1663	1438	6314	6370	0	7084	8813	3618	263	226	0	35789
NIG 804	2339	861	0	3728	0	9493	7469	2341	0	390	0	26621
NIG 805	547	1063	190	2486	4055	4802	4070	129	310	105	0	17757
NIG 806	0	0	0	64	0	0	0	0	0	0	0	64
NIG 807	0	0	0	59	0	0	0	0	0	0	0	59
NIG 808	0	0	0	57	0	0	0	0	0	0	0	57
NIG 809	0	0	0	8	0	0	0	0	0	0	0	8
NIG 810	0	0	0	5	0	0	0	0	0	0	0	5
NIG 811	0	0	0	101	0	0	0	0	0	0	0	101
NIG 812	0	0	0	33	0	0	0	0	0	0	0	33
NIG 813	0	0	0	17	0	0	0	0	0	0	0	17
NIG 814	0	0	0	19	0	0	0	0	0	0	0	19
NIG 901	0	234	872	778	1398	600	206	0	185	160	192	4625
NIG 902	0	181	1108	531	366	518	123	0	0	0	0	2827
NIG 903	0	328	3775	1468	608	907	412	0	167	224	290	8179
NIG 904	299	122	848	342	422	835	373	0	96	0	0	3337
NIG 905	0	114	2600	928	1299	558	231	0	126	0	0	5856
NIG 906	0	266	1177	355	0	487	345	0	86	0	0	2716
NIG 907	0	79	689	267	0	669	305	0	103	0	0	2112
NIG 908	0	318	926	504	0	395	367	0	0	0	0	2510
NIG 909	0	95	662	202	0	373	130	0	0	0	0	1462
NIG 910	0	274	663	100	0	218	356	0	0	0	0	1611
Total Nigerian Clones	7762	16312	27009	28572	11931	36207	32226	9250	2310	1277	482	173338
RRIM600	7763	4091	1254	14965	3129	24457	9315	25349	19049	9480	13299	132151
RRIM614	234	0	0	0	0	0	0	0	0	0	0	234
RRIM707	767	1033	0	0	0	0	11538	0	0	0	0	13338
RRIM501	0	0	0	0	0	2612	0	0	0	0	0	2612
RRIM 62	0	0	0	0	0	1804	0	0	0	0	0	1804
RRIC 45	1736	4114	5558	8805	0	3529	4333	2767	3986	0	370	35198
PB 28/59	3415	4013	10567	10891	5690	12224	0	546	0	24	0	47370
PB5/51	0	0	3450	5112	140	6160	5028	186	0	0	0	20076
PB 217	3702	3045	10942	5376	3542	10072	2687	0	0	0	0	39366
PR 107	17614	12063	19309	20558	2358	23539	11549	18319	3791	6559	8703	144362
GT 1	12507	14310	15789	20128	9703	12407	23018	24290	19250	6933	20480	178815
Total Exotic Clones	47738	42669	66869	85835	24562	96804	67468	71457	46076	22996	42852	615326

produced between 1996 and 2006. The implication of this is that rubber farmers are deprived of the benefits of Nigerian developed rubber clones particularly the NIG 800 series which have been tested, tried and found to be higher yielding (>2000 kg DRC/ha/year) with other desirable characteristics. Among the exotic clones, GT 1 recorded the highest number of production (178,815) followed by PR 107 (144,364) and RRIM 600 (132,151); while in the NIG developed clone series, NIG 800, NIG 801, NIG 802, NIG 803, NIG 804 and NIG 805 were the most patronized with production figure ranged between 35,789 (NIG 803) to 17,733 (NIG 805). This may be due to lack of deliberate policy by the Institute on the production and distribution of RRIN developed clones, as it was reported by one of the budders' supervisors that bud wood for the Nigerian developed rubber clones were scanty coupled with ineffective extension services to get the farmers to know the potentials of these clones. This finding is in line with the report of (Aigbekaen et al. 2000). Thus this trend can be averted by developing RRIN Developed bud wood nursery and strengthening the extension department of the Institute.

Annual Production of Budded Seedlings in RRIN (1996 – 2006)

Table 2 depicts fluctuation in the production of budded stumps with the highest production recorded in 2001 (133,011) and the least in 2005 (24,273). The rate of budding success ranged between 33% in 2005 to 52% in 2001.

The Impact of Budders' Inconsistency to work on the Budding success in the RRIN nursery (1996 to 2006)

Figure 1 depicts the number of budders worked during the period, 1996 – 2006. The study revealed high level of inconsistency to work among the budders. This could be due to the fact that most of the budders were casual staff. This explains the fluctuations in the total budded stumps and the budding success observed in the study. The year 2002 recorded the lowest number of budders, while 1996 had the highest budders' attendance followed by the year 1998. However looking at Table 2, the percentage budding successes did not tally with the number of budders. This is because budding is a skill that requires experienced hand for effective result as Giroh et al. (2007) reported that increase in the budding success was observed among rubber budders in RRIN with respect to number of years spent on the task. This explains why there was low percentage success rates recorded in the study, ranged between 33 – 52%; with an average of 45%.

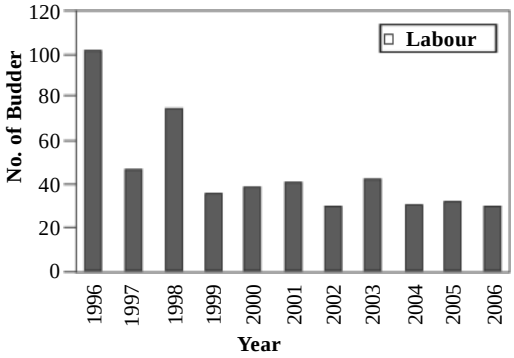

Fig. 1. Annual usage of budders in RRIN (1996 – 2006)

Table 2: Summary of budded stump production in Nigeria (1996 –2006)

Year	*Total Budded*	*Total Success*	*Percentage Success*
1996	161017	55500	35
1997	137290	58981	43
1998	226971	93878	41
1999	223072	114407	51
2000	67876	36493	54
2001	256266	133011	52
2002	210640	99694	47
2003	164164	84516	51
2004	94234	48386	51
2005	72622	24273	33
2006	109004	43334	40
Total	1723156	792473	46

Analysis of Budding Success in Relation to Time of the Year

The eleven years study period showed that the month of May and June had the highest rate of success in terms of budding success (Fig. 2). The budding was done during the rainy seasons within the months of April, May, June, July, August and September. The results however indicated that budding successes declined drastically from the month of September to November. The data also indicated that the Institute relied on only four months of the year (April – July) for production of its budding stump seedlings.

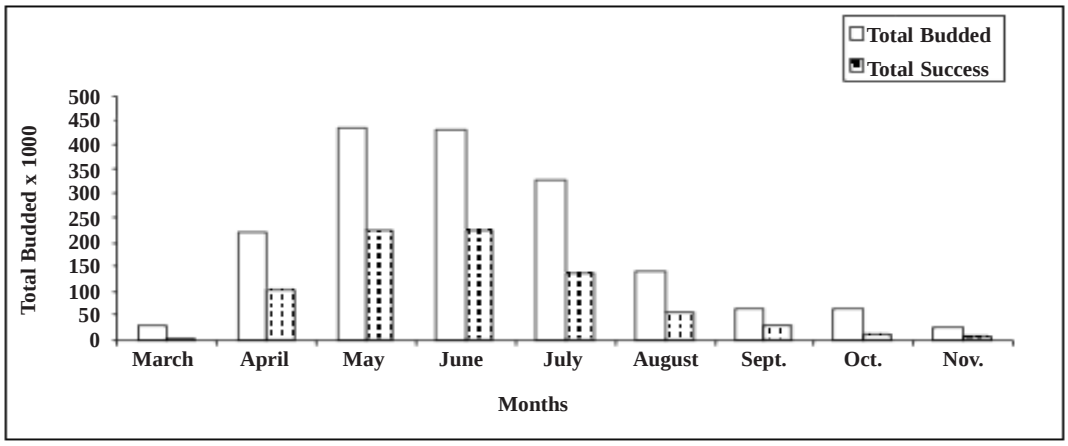

Fig. 2. Month of budding on bud success

CONCLUSION

Rubber Research Institute of Nigeria though has developed high yielding clones of rubber, laid less emphasis on their propagation and distributions. Generally, there was low efficiency of budding success (mean of 45%) during the period of study. These might be due to the fact that the Institute used inexperienced budders mainly and who could not stick to the task.

RECOMMENDATIONS

The Institute is advised to make maximum use of the six wet months of April to September for production of its budded stumps. The Institute can also venture to exploit the use of irrigation for the year round production as well as the use of biotechnology techniques for mass production of the rubber planting materials. Bud wood nursery for Nigerian developed clones should be developed and strengthen the extension services system in the Institute for effective dissemination of the technology to farmers as they have been proved to have high latex yielding capacities, especially now that rubber has assumed a financial boom in the international market. It should also fully exploit the new policy focus of the Federal Government of Nigeria under the Presidential Initiative on rubber to get the RRIN developed clones to rubber farmers.

REFERENCES

Aigbekaen EO, Imarhiagbe EO, Omokhafe KO 2000. Adoption of some recommended agronomic practices of natural rubber (*Hevea brasiliensis* Muel. Arg) in Nigeria. *Journal of Agriculture Forestry and Fishery,* 1: 51-56.

Alika JE 1982. Preliminary assessment of some hand pollinated progenies of rubber in Nigeria. *Indian Journal of Agricultural Science*, 52: 367 – 369.

Delabarre MA, Serrier JB 2000. Propagation of planting materials. *RUBBER. The Tropical Agriculturist*, pp. 22-49. CTA, POB 380, 6700 AJ Wageningen. The Netherlands.

Giroh DY, Adebayo E F 2007. Comparative Productivity Analysis of permanent and non-permanent Rubber Tappers in State rubber farms of Nigeria. *Journal of Agriculture and Social Science*, 3(4): 107- 111

Mekako HU 1983. *Proposed Breeding Programme for Hevea brasiliensis*. Benin City: Rubber Research Institute of Nigeria.

Onokpise OU, Olapade O, Mekako HU 1986. Genotype x Environment Interaction in *Hevea brasiliensis*. *Indian Journal of Genetics*, 46(3): 506 – 514.

Omokhafe KO, Nasiru I 2005. Genetic improvement of *Hevea brasiliensis* in Nigeria. *Proceeding of the International Rubber Conference India*, pp. 13 – 17.

Rubber Research Institute of Nigeria1983, 1995. *Annual Report of the Rubber Research Institute of Nigeria*. Benin City, Nigeria.