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Effect of Baling Temperature on Storage of Crated Block Rubbers (SMR 5L, 10 and 5CV)

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The storage behaviour of SMR 5L, 10 and 5CV in a 1-tonne crate is studied. The baling temperature has a marked influence on the rate of increase in viscosity of SMR 5L and 10. About half to two-thirds of the maximum possible viscosity increase occurs during the first few months of storage.

Hydroxylamine treatment at 0.15% wt in the preparation of SMR 5CV controls effectively the increase in viscosity to less than five Mooney units irrespective of the baling temperature used. For semicarbazide to be effective, it is necessary to dip the wet crumbs in a 1.0% wt solution and to bale the rubber below 60°C preferably near 35°C.

The viscosity of natural rubber increases on storage. This storage-hardening phenomenon has been studied by many workers. Two prime factors influence the rate at which storage-hardening occurs; these are the temperature of storage and ambient humidity.

Storage-hardening is brought about by crosslinking of aldehydic groups on the rubber molecule with aldehyde-condensing groups present in the non-rubbers or elsewhere. The process of storage-hardening can be inhibited by the use of aldehyde-condensing agents such as semicarbazide or hydroxylamine neutral sulphate[1,2,3]. Commercial processes use these chemical treatments for producing constant-viscosity rubbers namely SMR 5CV and 5LV[4,5].

In the production of conventional rubbers such as sheets and crepers, the drying temperature and the temperature of the rubber at the time of baling are low. Consequently, their effect on the rate of increase in viscosity may be expected to be small. In the production of block rubbers, the baling temperature can be expected to play an important role in determining the rate of viscosity increase. This is because block rubbers are packed into 1-tonne crate and heat can be conserved in the central portion of the pallet for one to two months since rubber is a poor conductor of heat.

This study focuses on the effect of baling temperature of the storage-hardening behaviour of SMR 5L, 5CV and SMR 10 (or 20) stored in a 1-tonne crate. Two varieties of SMR 5CV are examined: one treated with hydroxylamine and the other semicarbazide.

MATERIALS AND METHODS

Preparation

SMR 5L, 10 and 5CV were prepared following standard procedures[6]. For SMR 5CV, the three methods of viscosity-stabilisation employed were (a) addition of 0.15% wt hydroxylamine neutral sulphate to the latex (b) dipping wet latex crumbs in 1.0% wt semicarbazide solution and (c) addition of 0.5% wt semicarbazide to the latex.

Bale per Treatment

For the storage trials, a minimum of two bales per treatment was used.

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Baling Temperature

The temperature of the dry crumbs was adjusted to 35°C, 55°C and 100°C at the cooling stage before baling.

Storage

The rubber bales were stored as the third and fourth layers in the ISO 1-tonne crate. The rest of the crate were made up with rubber from normal production and baled at the temperature appropriate to the storage trial. In order to study the variation within a crate, bales were also stored at the third, fourth, fifth and sixth layers.

Sampling and Testing

The samples were removed from the bale corners kept at the inner (central) portion and at the outer portion of the crate; consequently, only one inner and two outer corners were taken. The relative position of the bales remained unchanged throughout the storage period. The Mooney viscosity, Wallace plasticity (Po) and PRI of the samples were determined.

Since rubber is a poor conductor of heat, it may be deduced that the effect of baling temperature is greatest at the central portion of the crate. Consequently, the first series of experiments concentrated on storage behaviour of bales located in the central portions of the crate. The second series studied the behaviour over the entire crate. The test results of these trials are summarised in *Tables 1* to *12*.

Effect of Baling Temperature

Mooney Viscosity and Po. The effect of baling temperature on the rate of increase in viscosity of SMR 5L and 10 is very marked — the higher the baling temperature the greater the rate of viscosity increase *(Table 1).* As might be expected, high baling temperature increases the viscosity of SMR 5L more than that of SMR 10; this could possibly be due to the higher content of residual aldehydic groups and the higher storage-hardening index of SMR 5L rubbers[3]. Comparing viscosity data on rubbers stored

TABLE 1. EFFECT OF BALING TEMPERATURE ON MOONEY VISCOSITY OF SMR 5L AND SMR 10 ON STORAGE

Type	Baling temp.	Initial viscosity	Increase in viscosity after storage (month)				Increase after four years' storage
			One	Two	Three	Four	
5L	35	74	4	4	5	8	Average 19 units
	55	74	6	7	9	11	Range 13 - 27 units
	100	73	11	11	14	15	
10	35	83	3	4	10	8	Average 15 units
	55	84	6	7	5	10	Range 10 - 29 units
	100	87	6	6	7	10	

Data above represent the average results of ten bale (inner and outer) corner samples taken from five bales (the bales were kept at the third and fourth layers in SMR crate). The spread of values over the five bales for a particular temperature, bale corner position and at a particular storage time is no more than five Mooney units.

The four-year test data are obtained from Bristow, G.M. (1974) Storage hardening of natural rubber, *NR Technology,* vol. 5, part 1.

TABLE 2. DIFFERENCE IN MOONEY VISCOSITY BETWEEN INNER AND OUTER BALE CORNERS OF SMR 5L AND SMR 10

Type	Baling temp. (°C)	Storage period (month) One	Two	Three	Four
5L	35	+1	+1	+1	0
	55	+2	+2	+2	+2
	100	+8	+6	+6	+5
10	35	0	+1	+2	0
	55	+1	+2	+1	+1
	100	+3	+2	+3	+2

Data above represent the average results of ten bales (inner and outer) corner samples taken from five bales (the bales were kept at the third and fourth layers in SMR crate). The spread of values over the five bales for a particular temperature, bale corner position and at a particular storage time is no more than five Mooney units.

A positive value indicates that the viscosity of the inner corner is higher.

TABLE 3. EFFECT OF BALING TEMPERATURE ON WALLACE PLASTICITY OF SMR 5L AND SMR 10 ON STORAGE

Type	Baling temp. (°C)	Initial plasticity	Increase in Po after storage (month) One	Two	Three	Four
5L	35	52	2	0	1	3
	55	53	2	1	1	3
	100	50	5	5	7	6
10	35	51	2	0	2	3
	55	50	3	2	3	4
	100	50	5	2	2	5

Data are averages of the inner and the outer corners of five bales.

for four to five years[7], it may be deduced that the highest rate of viscosity increase

TABLE 4. EFFECT OF BALING TEMPERATURE ON PLASTICITY RETENTION INDEX OF SMR 5 AND SMR 10 ON STORAGE

Type	Baling temp. (°C)	Initial PRI	PRI change after storage (month) One	Two	Three	Four
5L	35	99	–10	–7	–10	–11
	55	97	–10	–7	–11	–10
	100	101	–16	–13	–18	–15
10	35	85	–5	–3	–8	–10
	55	86	–6	–6	–6	–8
	100	86	–9	–6	–7	–9

Data are averages of the inner and the outer corners of five bales. A negative value indicates that the PRI drops on storage.

occurs during the first few (perhaps six) months of storage; thereafter, the rate slows down. By then SMR 5L could possibly have achieved about half of the maximum increase, and SMR 10 about two-thirds.

The marked effect of baling temperature is also evident in the differences observed between the inner and the outer corners of bales *(Table 2)*. Data on Po show a similar pattern *(Table 3)*.

Plasticity Retention Index (PRI). Concurrent with the increase in viscosity on storage, the PRI of SMR 5L and 10 decreases. This drop in PRI on storage is more pronounced for SMR 5L than for SMR 10 *(Table 4)*. This agrees with data from another study[7], where it was found that the drop is highest with latex rubbers, due to their high initial PRI. An important point to note is that the drop in PRI can exceed ten units in the first four months of storage.

Position in SMR Crate

When rubber is stored in an SMR crate the rubber on the outer portions of the crate cools faster. Consequently, the viscosity increase of the top layer of bales is lower

TABLE 5. EFFECT OF BALING TEMPERATURE AND POSITION IN CRATE ON MOONEY VISCOSITY OF SMR 5L ON STORAGE

Baling temp. (°C)	Position in crate (layer)	Initial Mooney viscosity	Viscosity increase after storage (month) One	Two	Four
30	Third	72	5	7	10
	Fourth	72	5	6	10
	Fifth	77	4	6	9
	Sixth	77	3	8	9
	Crate	75	4	7	9
55	Third	70	6	7	11
	Fourth	70	6	6	10
	Fifth	70	5	6	9
	Sixth	75	4	7	8
	Crate	72	5	6	9
100	Third	71	12	13	15
	Fourth	72	9	13	14
	Fifth	72	9	12	13
	Sixth	72	6	7	7
	Crate	72	8	11	11

Data are averages of the inner and the outer corners of two bales.

The crate figure is the average of data for the fourth, fifth and sixth layers since these three layers represent half the crate.

Data for third month are not available.

TABLE 6. EFFECT OF BALING TEMPERATURE AND POSITION IN CRATE ON WALLACE PLASTICITY OF SMR 5L ON STORAGE

Baling temp. (°C)	Position in crate (layer)	Initial Po	Change in Po after storage (month) One	Two	Four
35	Third	53	+6	+2	+1
	Fourth	53	+5	+2	+3
	Fifth	54	+5	+4	−1
	Sixth	54	+4	+5	−8
	Crate	54	+5	+4	−2
55	Third	51	+4	+4	+5
	Fourth	51	+4	+4	+6
	Fifth	51	+4	+2	−1
	Sixth	54	+5	+3	−3
	Crate	52	+4	+3	+1
100	Third	52	+4	+4	+4
	Fourth	52	+4	+4	+4
	Fifth	52	+5	+6	+3
	Sixth	52	+4	+2	+1
	Crate	52	+4	+4	+3

Data are averages of the inner and the outer corners of two bales.

The crate figure is the average of data for the fourth, fifth and sixth layers since these three layers represent half the crate.

Data for third month are not available.

Negative results are probably due to errors in Po tests.

TABLE 7. EFFECT OF BALING TEMPERATURE AND POSITION IN CRATE ON PLASTICITY RETENTION INDEX OF SMR 5L ON STORAGE

Baling temp. (°C)	Position in crate (layer)	Initial PRI	PRI change after storage (month)		
			One	Two	Four
30	Third	95	−3	−3	−22
	Fourth	94	−3	−3	−19
	Fifth	89	0	−1	−19
	Sixth	81	+8	+4	−5
	Crate	87	+2	0	−14
55	Third	99	−5	−5	−14
	Fourth	98	−6	−8	−12
	Fifth	95	0	0	−19
	Sixth	93	−3	−3	−18
	Crate	98	−3	−4	−16
100	Third	96	−10	−7	−11
	Fourth	98	−11	−11	−12
	Fifth	96	−7	−8	−9
	Sixth	96	−5	−3	−3
	Crate	97	−8	−7	−8

Data are averages of the inner and the outer corners of two bales.

The crate figure is the average of data for the fourth, fifth and sixth layers since these three layers represent half the crate.

Data for third month are not available.

A negative value indicates a drop in PRI on storage.

TABLE 8. EFFECT OF BALING TEMPERATURE AND POSITION IN CRATE ON MOONEY VISCOSITY OF SMR 10 ON STORAGE

Baling temp. (°C)	Position in crate (layer)	Initial Mooney viscosity	Viscosity increase after storage (month)		
			One	Two	Four
30	Third	79	4	6	11
	Fourth	81	2	5	9
	Fifth	80	1	4	8
	Sixth	80	3	3	8
	Crate	80	2	4	8
55	Third	81	6	9	11
	Fourth	82	3	6	9
	Fifth	84	2	4	7
	Sixth	82	3	5	8
	Crate	83	3	5	8
100	Third	82	5	9	12
	Fourth	82	6	10	10
	Fifth	82	6	10	12
	Sixth	82	5	9	11
	Crate	82	6	10	11

Data are averages of the inner and the outer corners of two bales.

The crate figure is the average of data for the fourth, fifth and sixth layers since these three layers represent half the crate.

Data for third month are not available.

TABLE 9. EFFECT OF BALING TEMPERATURE AND POSITION IN CRATE ON WALLACE PLASTICITY OF SMR 10 ON STORAGE

Baling temp. (°C)	Position in crate (layer)	Initial Po	Change in Po after storage (month)		
			One	Two	Four
30	Third	52	+4	−1	+2
	Fourth	51	+1	+1	+1
	Fifth	47	0	−1	+4
	Sixth	50	0	+3	0
	Crate	49	+1	+1	+1
55	Third	52	+1	+2	+3
	Fourth	53	+3	0	+3
	Fifth	55	+3	+2	−6
	Sixth	54	+2	0	−3
	Crate	54	+3	+1	−2
100	Third	51	+3	+1	+5
	Fourth	52	+2	0	+1
	Fifth	51	+2	+2	+3
	Sixth	50	+2	0	+6
	Crate	51	+2	+1	+3

Data are averages of the inner and the outer corners of two bales.

The crate figure is the average of data for the fourth, fifth and sixth layers since these three layers represent half the crate.

Data for third month are not available.

Negative results are probably due to errors in Po tests.

TABLE 10. EFFECT OF BALING TEMPERATURE AND POSITION IN CRATE ON PLASTICITY RETENTION INDEX OF SMR 10 ON STORAGE

Baling temp. (°C)	Position in crate (layer)	Initial PRI	Change in PRI after storage (month)		
			One	Two	Four
35	Third	80	−4	−2	−6
	Fourth	80	−2	−3	−3
	Fifth	75	+1	0	+2
	Sixth	76	+1	+2	−3
	Crate	77	0	0	−1
55	Third	80	−2	−2	+6
	Fourth	79	−4	−2	+7
	Fifth	77	+1	+4	+1
	Sixth	78	−3	+2	−5
	Crate	78	−2	−1	+1
100	Third	82	−10	−4	+4
	Fourth	82	−8	−6	+6
	Fifth	80	−8	−5	+11
	Sixth	76	−4	0	+12
	Crate	79	−6	−3	+10

Data are averages of the inner and the outer corners of two bales.

The crate figure is the average of data for the fourth, fifth and sixth layers since these three layers represent half the crate.

Data for third month are not available.

A negative value indicates a decrease in PRI.

TABLE 11(a). EFFECT OF BALING TEMPERATURE ON CONSISTENCY OF PRODUCTION (SMR 5L)

Property	Baling temp. (°C)	Range of value after storage (month) Initial	Two	Four
Mooney viscosity	Below 60°C	74 – 75	78 – 84	82 – 87
	No control	72 – 74	78 – 88	82 – 91
Wallace plasticity (Po)	Below 60°C	51 – 54	50 – 55	54 – 57
	No control	47 – 54	50 – 56	54 – 58
PRI	Below 60°C	91 – 103	87 – 98	83 – 90
	No control	91 – 109	85 – 98	81 – 93

Data from same source as *Table 1.*

TABLE 11(b). EFFECT OF BALING TEMPERATURE ON CONSISTENCY OF PRODUCTION (SMR 5L)

Property	Baling temp. (°C)	Range of value after storage (month) Initial	Two	Four
Mooney viscosity	Below 60°C	70 – 77	75 – 87	78 – 86
	No control	69 – 77	75 – 92	77 – 94
Wallace plasticity (Po)	Below 60°C	50 – 54	52 – 59	44 – 58
	No control	50 – 54	52 – 59	44 – 58
PRI	Below 60°C	81 – 100	86 – 92	67 – 87
	No control	81 – 100	81 – 95	67 – 94

Data from same source as *Table 5.*

than that of the bales kept on the middle layers *(Tables 5* and *8)*. This differential rate of viscosity increase is magnified when the baling temperature is high.

Consequently, the drop in PRI is higher for rubbers kept in the central portions of the crate *(Tables 7* and *10)*. The PRI data for SMR 10 at the fourth month of storage is erratic, possibly due to testing errors.

Consistency in SMR Production

The data presented would therefore suggest that the baling temperature has a significant effect on consistency in the raw rubber properties of SMR 5L and 10. *Tables 11* and *12* show that the spread of results in raw rubber properties is less when the baling temperature is controlled at below 60°C than when control is not exercised.

STORAGE BEHAVIOUR OF VISCOSITY-STABILISED RUBBERS (SMR 5CV)

Hydroxylamine neutral sulphate and semi-carbazide hydrochloride have been recommended for use in the preparation of viscosity-stabilised rubbers[4,5]. Their ability to stabilise the viscosity of the rubber is normally judged by the Accelerated Storage Hardening Test (ΔP) which uses Po measurements before and after subjecting the rubber to accelerated storage conditions[8]. Observations of storage behaviour of viscosity-stabilised rubber in an SMR crate have been rather limited.

TABLE 12(a). EFFECT OF BALING TEMPERATURE ON CONSISTENCY OF PRODUCTION (SMR 10)

Property	Baling temp. (°C)	Range of value after storage (month) Initial	Two	Four
Mooney viscosity	Below 60°C	82 – 86	85 – 93	90 – 96
	No control	82 – 88	85 – 96	90 – 98
Wallace plasticity (Po)	Below 60°C	46 – 54	49 – 54	52 – 55
	No control	46 – 54	49 – 55	51 – 57
PRI	Below 60°C	80 – 93	77 – 86	72 – 81
	No control	80 – 93	76 – 86	72 – 81

Data from same source as *Table 1*.

TABLE 12(b). EFFECT OF BALING TEMPERATURE ON CONSISTENCY OF PRODUCTION (SMR 10)

Property	Baling temp. (°C)	Range of values after storage (month) Initial	Two	Four
Mooney viscosity	Below 60°C	79 – 84	76 – 92	87 – 94
	No control	79 – 84	76 – 95	87 – 96
Wallace plasticity (Po)	Below 60°C	46 – 56	44 – 58	47 – 57
	No control	46 – 56	44 – 58	47 – 58
PRI	Below 60°C	74 – 82	71 – 84	70 – 89
	No control	74 – 84	71 – 84	70 – 94

Data from same source as *Table 8*.

Results from the present studies show that hydroxylamine is effective in stabilising the viscosity of latex rubber *(Tables 13* and *14)*. High baling temperature has virtually no effect on the absolute and the rate of increase in viscosity. The increase during the first four months of storage is not more than five units. Tests done on four to five-year-old SMR 5CV suggest that the viscosity increase is about six Mooney units and ranges from four to eight units[7].

Light-coloured SMR 5CV is prepared by the addition of semicarbazide, 0.5% wt on rubber, to the latex or by dipping the wet crumbs in a 1.0% wt of semicarbazide solution. While these rubbers pass the Accelerated Storage-Hardening Test actual storage shows that the increase in viscosity cannot be satisfactorily contained by the semicarbazide treatment (*Table 13*). The viscosity increase in the case where semicarbazide is added to latex is unacceptable. The dipping technique controls this increase slightly better but not adequately when high baling temperature is employed.

The effects on Po and PRI is consequent on the above mentioned effects on Mooney viscosity. The drop in PRI for hydroxylamine-treated SMR 5CV is less than ten units *(Tables 15* and *16)*.

Baling temperature has virtually no effect on the absolute and the rate of increase in viscosity of hydroxylamine-treated rubbers. This leads to improved consistency between

TABLE 13. EFFECT OF BALING TEMPERATURE ON MOONEY VISCOSITY OF VISCOSITY-STABILISED RUBBERS (SMR 5CV) ON STORAGE

Treatment	Baling temp. (°C)	Storage-hardening test (△ P)	Initial viscosity	Increase in viscosity after storage (month) One	Two	Three	Five
Hydroxylamine added to latex (0.15% wt)	35	8.0	58	2	3	2	3
	55	4.5	57	3	4	4	3
	100	4.5	59	2	2	2	3
Semicarbazide added to latex (0.5% wt)	35	7.5	66	3	6	7	10
	55	6.0	61	8	11	12	15
	100	8.0	65	8	10	11	14
Wet crumbs dipped in 1.0% wt semi-carbazide solution	35	5.0	67	2	4	4	6
	55	4.0	67	2	3	3	5
	100	7.0	65	5	8	9	9

Data are averages of the inner and the outer corners of two bales stored at the third and fourth layers of crate.

TABLE 14. DIFFERENCE IN MOONEY VISCOSITY BETWEEN INNER AND OUTER BALE CORNERS OF VISCOSITY-STABILISED RUBBERS

Treatment	Baling temp. (°C)	Storage period (month) One	Two	Three	Five
Hydroxylamine added to latex (0.15% wt)	35	0	0	0	0
	55	0	+1	+1	+1
	100	+1	+1	0	+2
Semicarbazide added to latex (0.15% wt)	35	0	+1	+2	+1
	55	+1	+2	+2	+1
	100	+6	+1	+4	+4
Wet crumbs dipped in 1.0% solution of semi-carbazide	35	0	0	+1	0
	55	0	0	−1	+1
	100	+6	+7	+4	+4

Data from same source as *Table 13.*

A positive difference indicates that the viscosity of the inner corner is higher.

bales within a crate at the time of production or in the consumer's factory *(Tables 17, 18* and *19).*

STATISTICAL NOTE

By employing factorial analysis, it can be ascertained that the effect of baling temperature on the increase in viscosity and the drop in PRI for SMR 5L and 10 is statistically significant at higher than the 5% level. Baling temperature does not affect the rate of viscosity increase of hydroxylamine-treated SMR 5CV.

CONCLUSION

The baling temperature has a marked influence on the storage behaviour of SMR 5L and 10. High baling temperatures promote a

TABLE 15. EFFECT OF BALING TEMPERATURE ON WALLACE PLASTICITY OF VISCOSITY-STABILISED RUBBERS (SMR 5CV) ON STORAGE

Treatment	Baling temp. (°C)	Storage-hardening test (△ P)	Initial Po	Change after storage (month)			
				One	Two	Three	Five
Hydroxylamine added to latex (0.15% wt)	35	8.0	40	−2	0	0	+2
	55	4.5	38	0	0	−1	+1
	100	4.5	41	−1	−2	−1	0
Semicarbazide added to latex (0.5% wt)	35	7.5	44	−1	+1	+1	+2
	55	6.0	43	0	+1	+2	+4
	100	8.0	43	0	+3	+2	+3
Wet crumbs dipped in 1.0% wt semi-carbazide	35	5.0	47	−1	−1	−1	+1
	55	4.0	46	−1	0	0	+2
	100	7.0	43	+2	+3	+4	+4

Data from same source as *Table 13.*

TABLE 16. EFFECT OF BALING TEMPERATURE ON PLASTICITY RETENTION INDEX OF VISCOSITY-STABILISED RUBBERS ON STORAGE

Treatment	Baling temp. (°C)	Initial PRI	Change of PRI after storage (month)			
			One	Two	Three	Five
Hydroxylamine added to latex (0.15% wt)	35	95	−2	−4	−4	−6
	55	92	−6	−5	−1	−4
	100	90	−1	−1	−1	−3
Semicarbazide added to latex (0.5% wt)	35	87	−1	−4	−5	−4
	55	88	−5	−3	−3	−5
	100	86	−3	−3	−4	−5
Wet crumbs dipped in 1.0% wt semicarbazide solution	35	87	−1	−3	−4	−4
	55	87	−1	−2	0	−7
	100	89	−7	−7	−7	−8

Data from same source as *Table 13.*

Data represent the average of the inner and the outer corner of two bales stored at the third and fourth layers of crate.

faster rate of increase in viscosity on storage. About half of the maximum possible increase in viscosity for SMR 5L occurs during the first six months of storage under Malaysian conditions and about two-thirds for SMR 10. This rate of increase is expected to be lower when the rubbers are stored in the temperate conditions of most consumer countries. The drop in PRI is consequent on the magnitude of the effect on Mooney viscosity.

Hydroxylamine is a very effective chemical for inhibiting the storage-hardening of rubber. The viscosity of hydroxylamine-treated SMR 5CV does not increase appreciably, irrespective of the baling temperature used.

Stabilisation of viscosity by treatment with semicarbazide is less satisfactory. To contain the rate of viscosity increase, it is necessary to prepare the rubber by dipping

TABLE 17. EFFECT OF BALING TEMPERATURE AND POSITION IN CRATE ON MOONEY VISCOSITY OF SMR 5CV (HYDROXYLAMINE-TREATED)

Baling temp. (°C)	Position in crate (layer)	Initial Mooney viscosity	Change in viscosity after storage (month)			
			One	Two	Three	Four
35	Third	64	−3	−2	-	0
	Fourth	62	−2	0	-	+2
	Fifth	63	−3	−1	-	0
	Sixth	62	−2	0	-	+1
	Crate	62	−2	0	-	+1
55	Third	63	−2	−1	-	0
	Fourth	63	−2	−1	-	+1
	Fifth	62	−1	0	-	+2
	Sixth	62	−1	0	-	+2
	Crate	62	−1	0	-	+2
100	Third	63	−1	0	-	+2
	Fourth	63	−1	0	-	+1
	Fifth	63	−2	−1	-	0
	Sixth	63	−3	−2	-	0
	Crate	63	−2	−1	-	0

Data are averages of the inner and outer corners of bales for each treatment.

The crate figure is the average of data for the fourth, fifth and sixth layers, since these three layers represent half the crate.

TABLE 18. EFFECT OF BALING TEMPERATURE AND POSITION IN CRATE ON PRI OF SMR 5CV (HYDROXYLAMINE-TREATED)

Baling temp. (°C)	Position in crate (layer)	Initial PRI	Change in PRI after storage (month)			
			One	Two	Three	Four
35	Third	100	−7	−9	-	−11
	Fourth	96	−5	−5	-	−5
	Fifth	98	−4	−8	-	−9
	Sixth	94	−2	−4	-	−5
	Crate	96	−4	−6	-	−6
55	Third	92	+2	−2	-	−1
	Fourth	93	+1	−6	-	−4
	Fifth	93	−1	−3	-	−5
	Sixth	98	−5	−6	-	−9
	Crate	94	−1	−5	-	−5
100	Third	95	0	−5	-	+1
	Fourth	94	−2	−4	-	+2
	Fifth	96	0	−7	-	−4
	Sixth	93	+2	−2		−3
	Crate	94	0	−4	-	−1

Data from same source as *Table 17*.

The crate figure is the average of data for the fourth, fifth and sixth layers, since these three layers represent half the crate.

TABLE 19. EFFECT OF BALING TEMPERATURE ON CONSISTENCY OF SMR 5CV PRODUCTION

Property	Baling temp. (°C)	Range of values after storage (month) Initial	Two	Four
Mooney viscosity	Below 60°C	62 – 66	61 – 63	62 – 64
	No control	62 – 66	61 – 65	62 – 67
Wallace plasticity (Po)	Below 60°C	40 – 44	41 – 46	42 – 44
	No control	40 – 44	41 – 46	41 – 44
PRI	Below 60°C	91 – 100	85 – 94	87 – 93
	No control	91 – 100	85 – 94	87 – 98

Data from same source as *Table 17*.

the wet crumbs in a 1.0% solution of semicarbazide. In addition the baling temperature must be kept below 60°C, preferably at 35°C.

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