

THE EFFECT OF MALAYSIAN TROPICAL HARDWOOD'S PROPERTIES ON CHIPS' SIZE DISTRIBUTION AND ACCEPTANCE FOR KRAFT PULPING

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USM Jangka Pendek (131/0230/0490)
Julai 1996 – Jun 1997

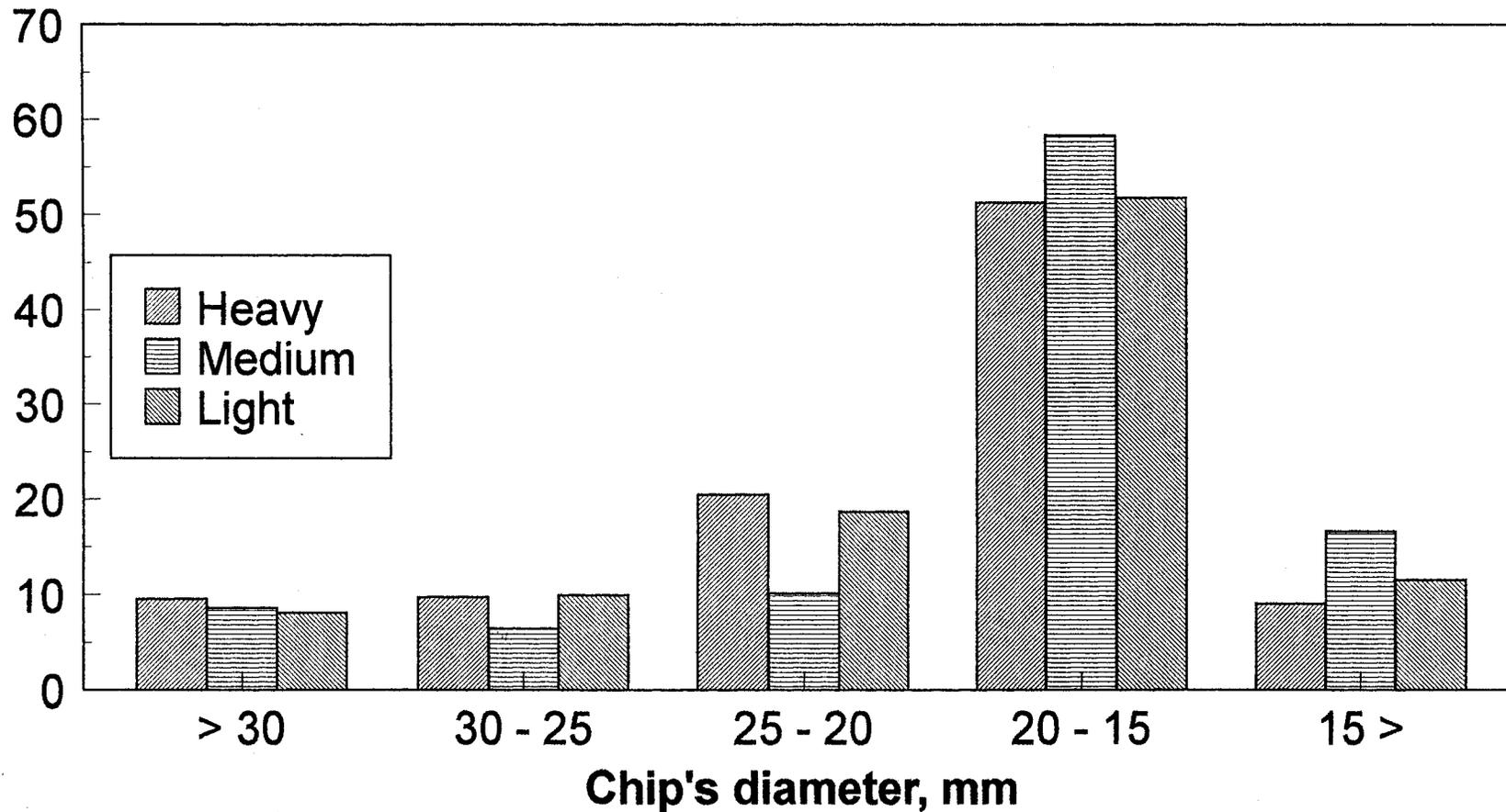
Abstract:

Chip quality has an effect on the quality of kraft pulp. Chips 10 to 30 mm long and 3 to 6 mm thick are prime materials for pulping. The chips' size is affected by wood quality and processing it undergone. In this experiment, the effect of wood's density, moisture content and feed length of three Malaysian tropical hardwoods on chips' production were studied. The woods were chipped by a drum chipper at FRIM, Kepong. These chips were screened into different diameter sizes by vibrated screens. Their thickness were measured by caliper. The studies found that wood's density, moisture content and feed length have an effect on chip's distribution size and on the quantity of acceptance chips for kraft pulping. It is also found that chips' thickness is related to its diameter.

Key words: chip, diameter, density, feed length, Malaysian tropical hardwood, moisture content, pulping, size distribution, thickness.

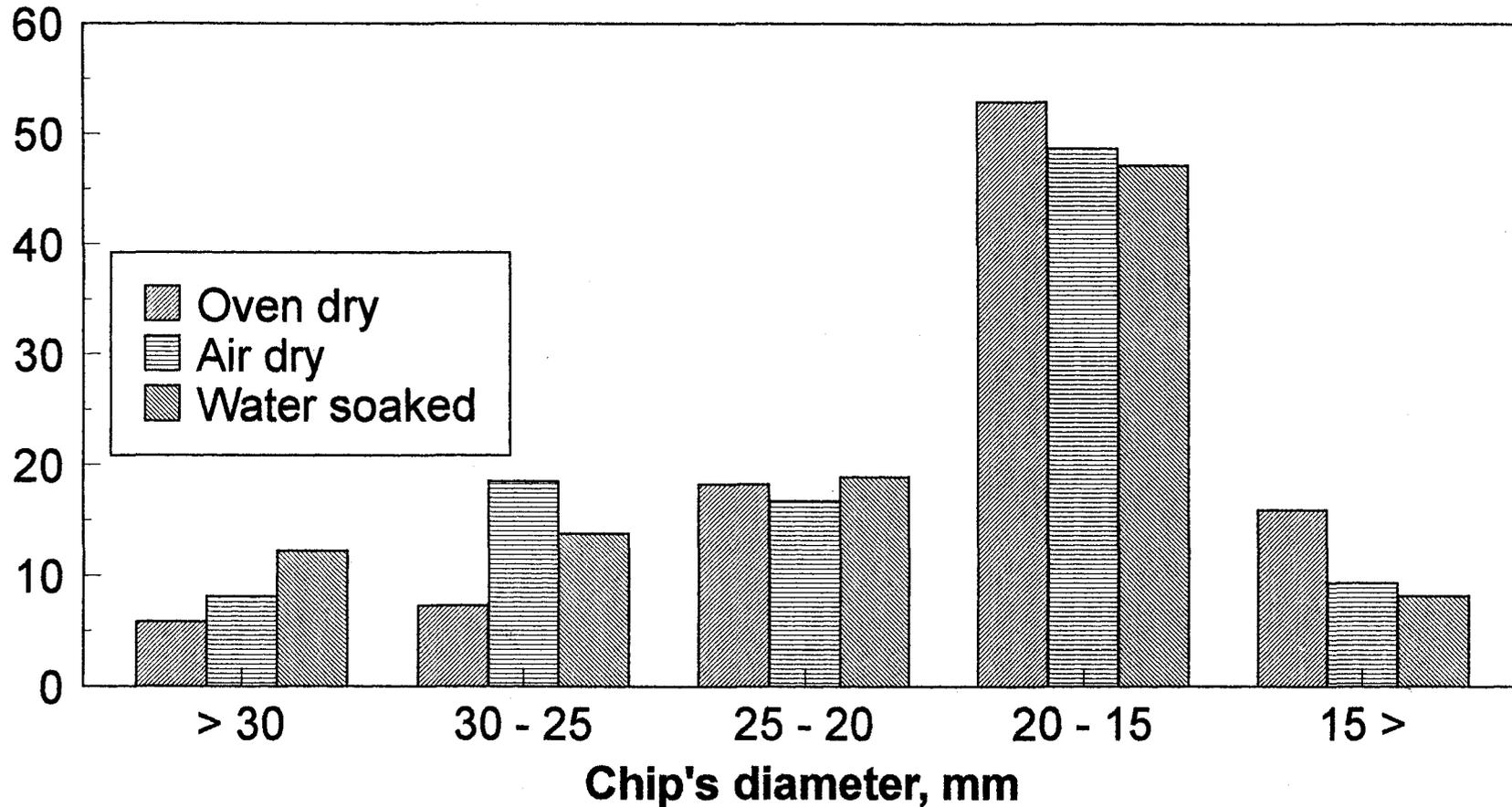
The effect of woods' density on chips' size distribution

Quantity, %



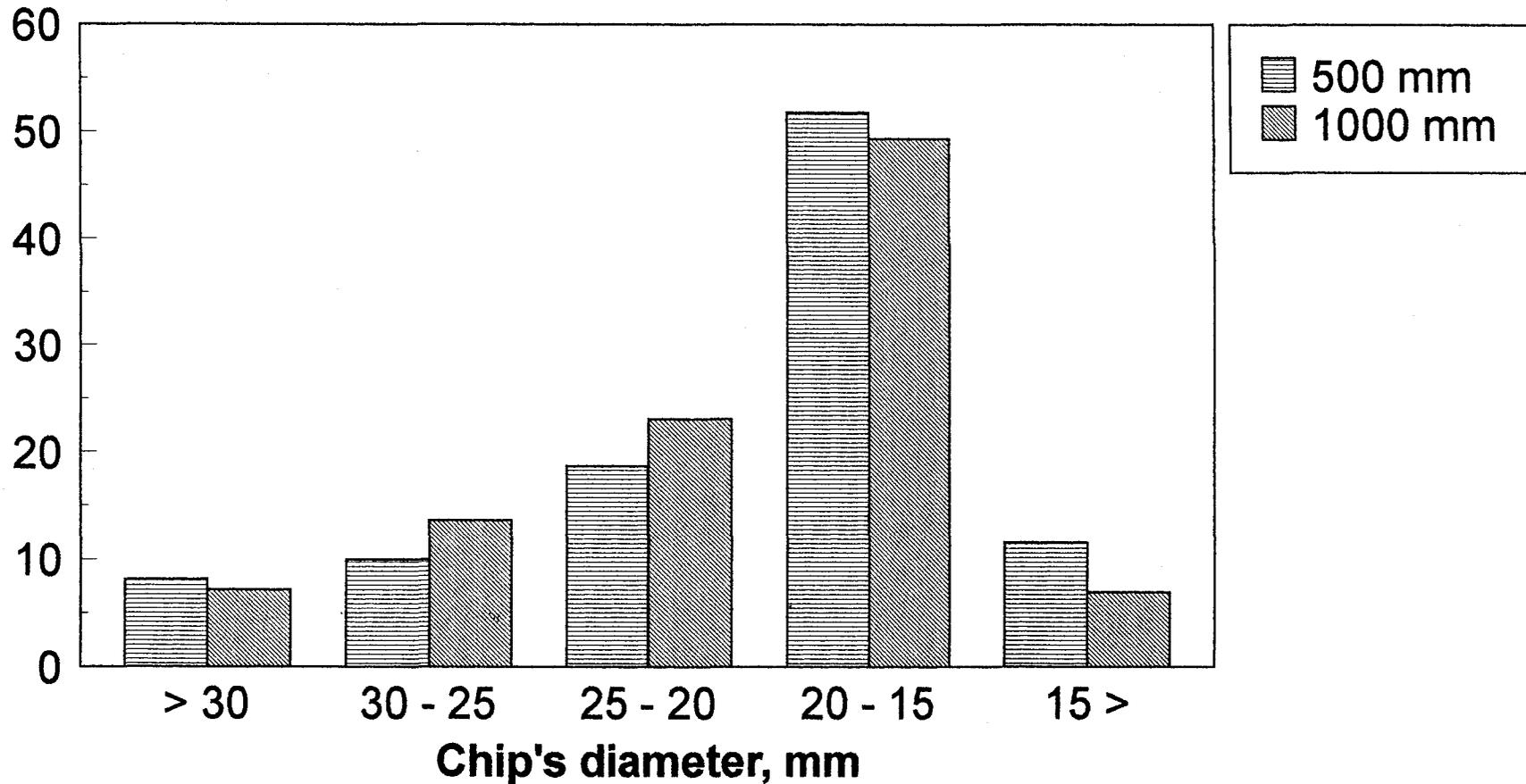
The effect of wood's moisture content on chips' size distribution

Quantity, %



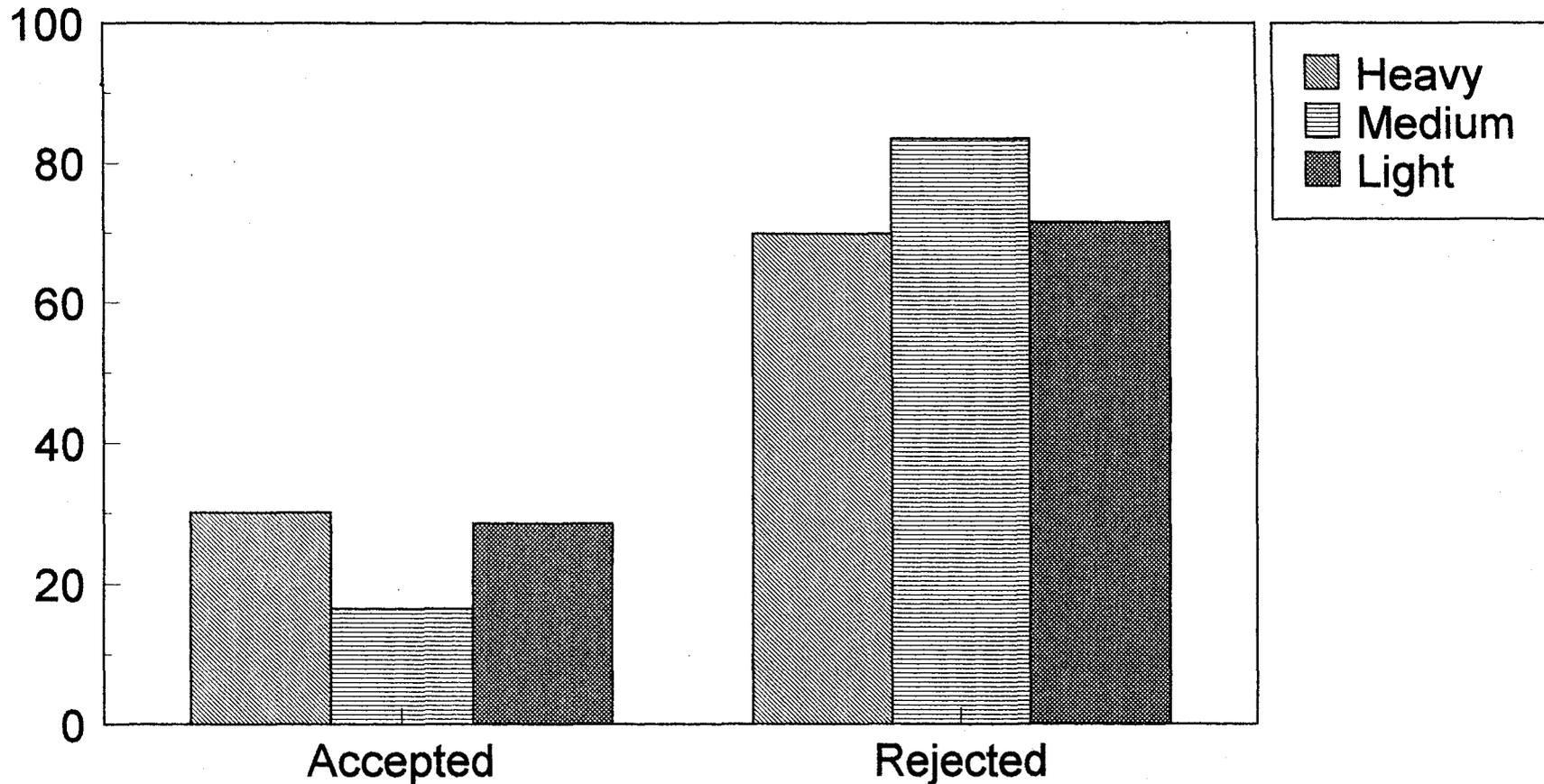
The effect of wood length during feed in on chips' size distribution

Quantity, %



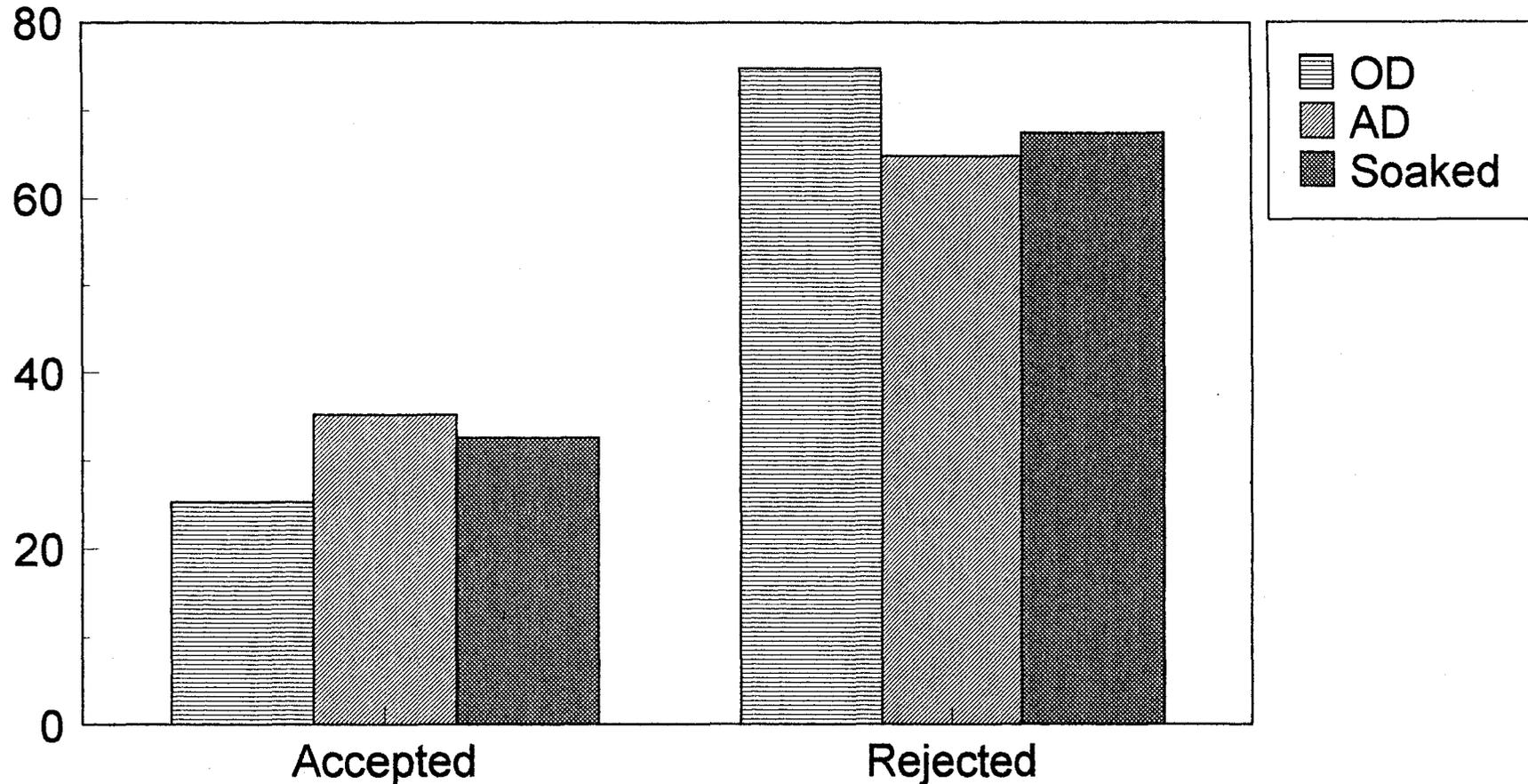
The effect of wood density on the quantity of chips accepted or rejected for kraft pulping.

Quantity, %



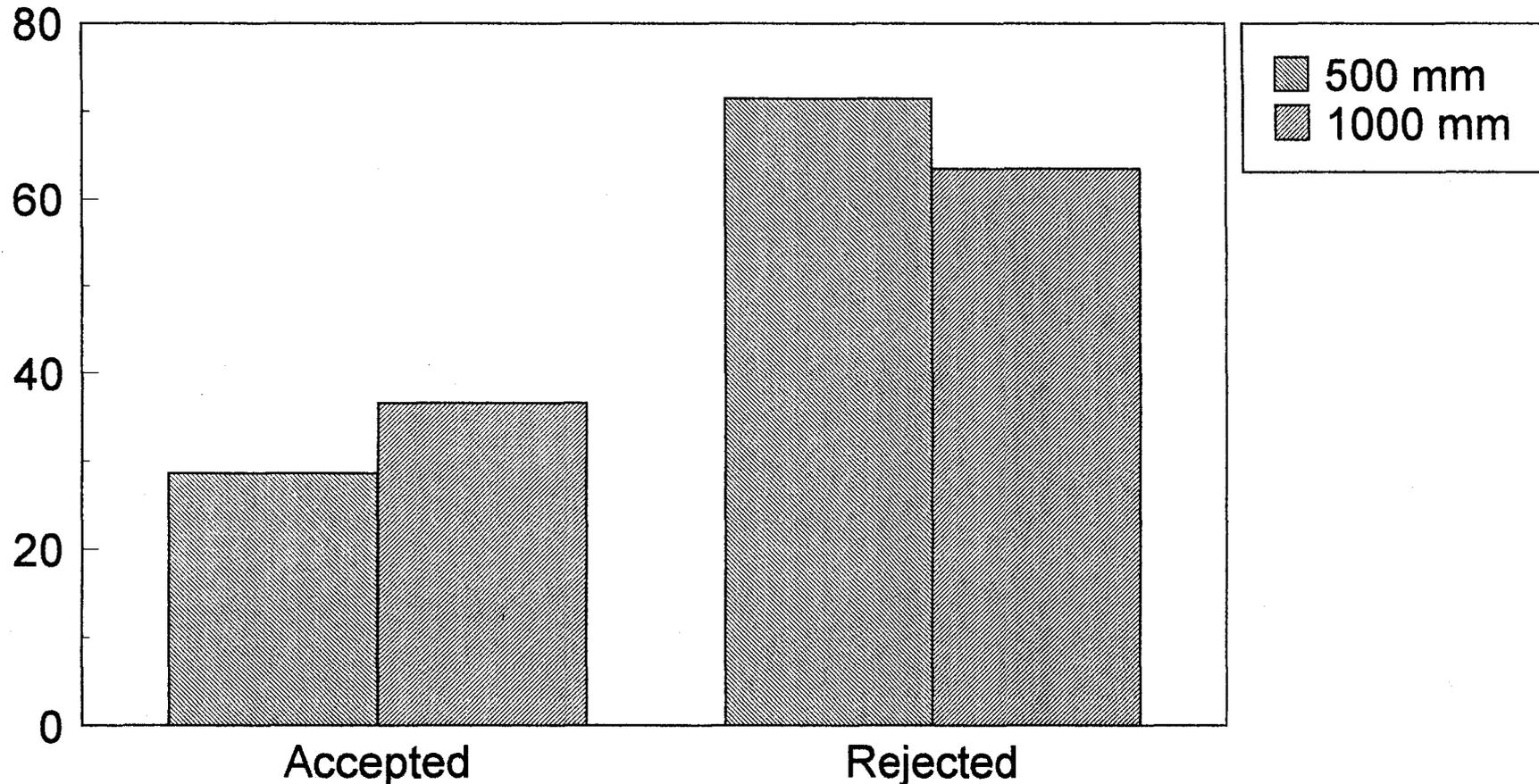
The effect of moisture content on the quantity of chips accepted or rejected for kraft pulping.

Quantity, %

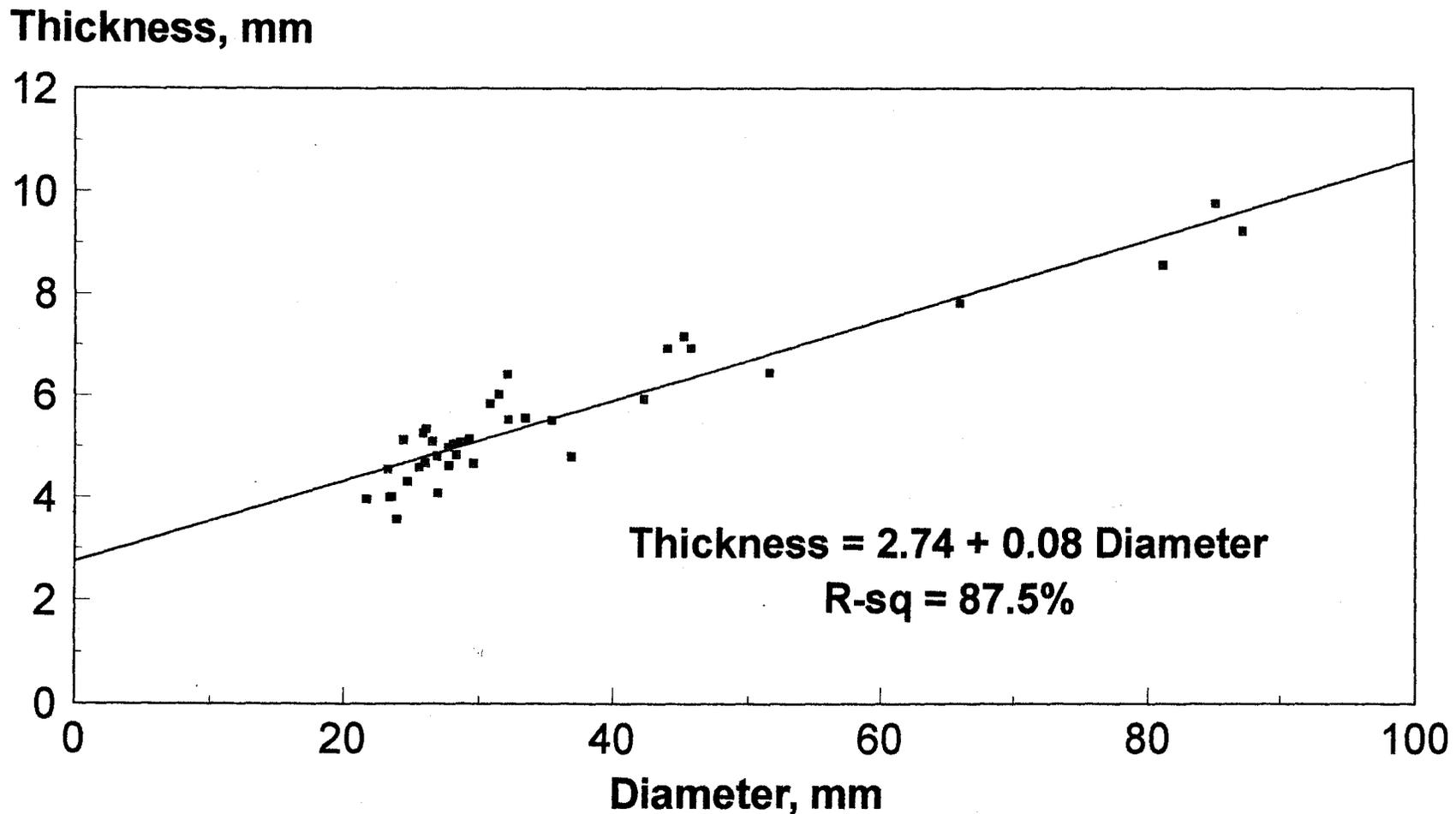


The effect of wood length during feed in on the quantity of chips accepted or rejected for kraft pulping.

Quantity, %



Relationship of chips' diameter to thickness of three species of Malaysian tropical hardwood.



THE EFFECT OF MALAYSIAN TROPICAL HARDWOOD'S DENSITY AND CHIP SIZE ON THE PULP YIELD, BLEACHABILITY AND HANDSHEET PROPERTIES OF KRAFT PULP.

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USM Jangka Pendek (131/0230/0490)
July 1996 – June 1997

Abstract:

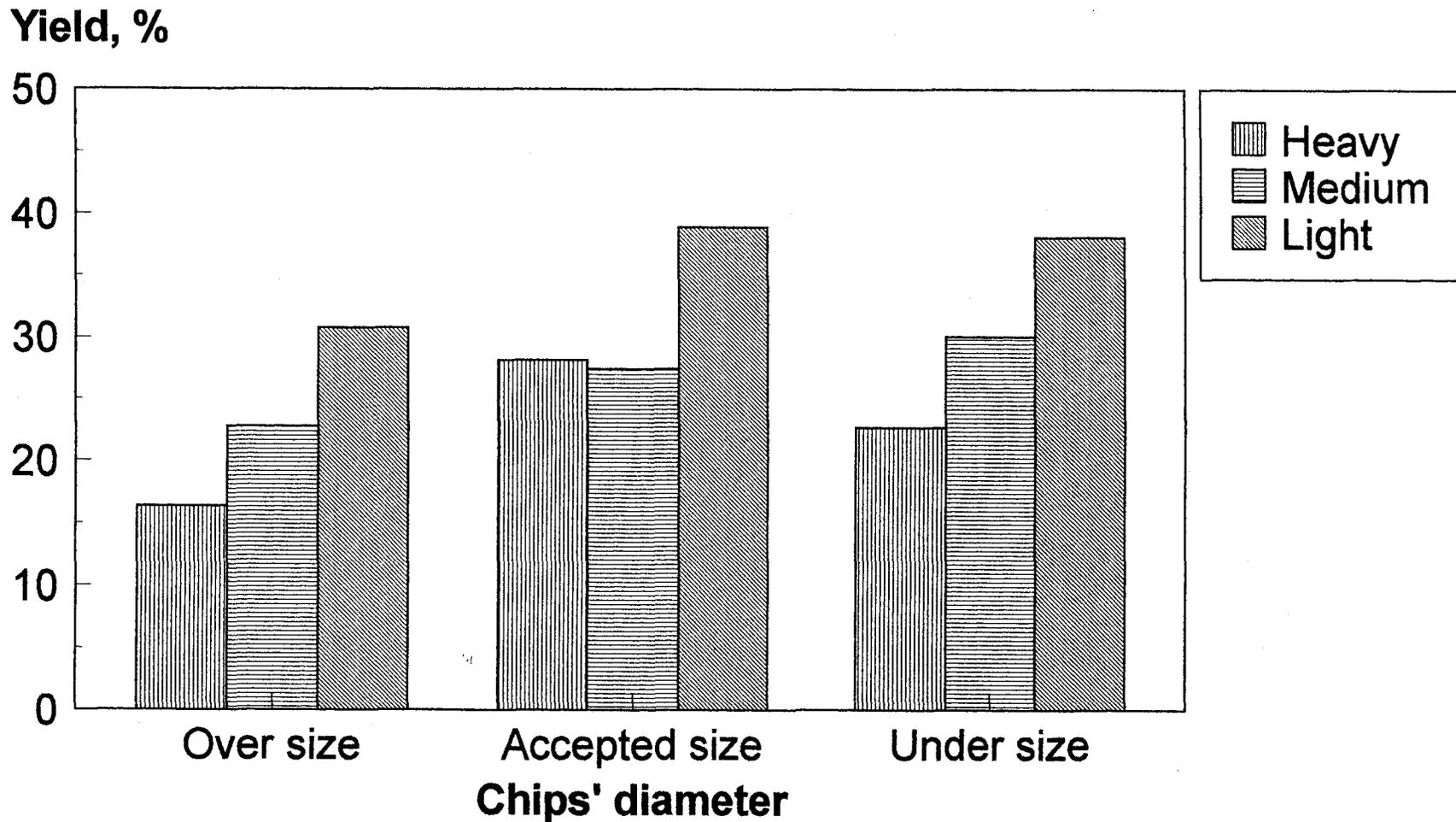
Wood density and chip size has an effect on the quality of kraft pulp. Chips 10 to 30 mm long and 3 to 6 mm thick are prime materials for pulping. Sizes more than 30 mm long is considered as oversize and less than 10 mm long is considered as undersize. No study on the effect of wood density and chip size of Malaysian tropical hardwood on kraft pulping has been made. In this experiment, the effect of wood's density and chip size of three Malaysian tropical hardwoods on kraft pulp production was studied. The woods were pulped at USM, Penang. The kraft pulping conditions were 20% of active alkali, 25% of sulfidity, 170°C of maximum temperature, 1.5 hours of time to maximum temperature, 2 hours of time at maximum temperature and 1:5 of wood to liquor ratio. The studies found that wood's density and chip size have an effect on screened pulp yield, bleachability and handsheets properties. Screened yield increased as the wood density decreased. The bleachability of pulp decreased as the chip size increased. The effect on handsheets properties varies depends on wood density and/or chip size. Generally, heavy hardwood has the highest mechanical properties compared to medium and light hardwoods.

Key words: chip diameter, handsheet properties, kappa number, kraft pulping, Malaysian tropical hardwood, wood density, yield.

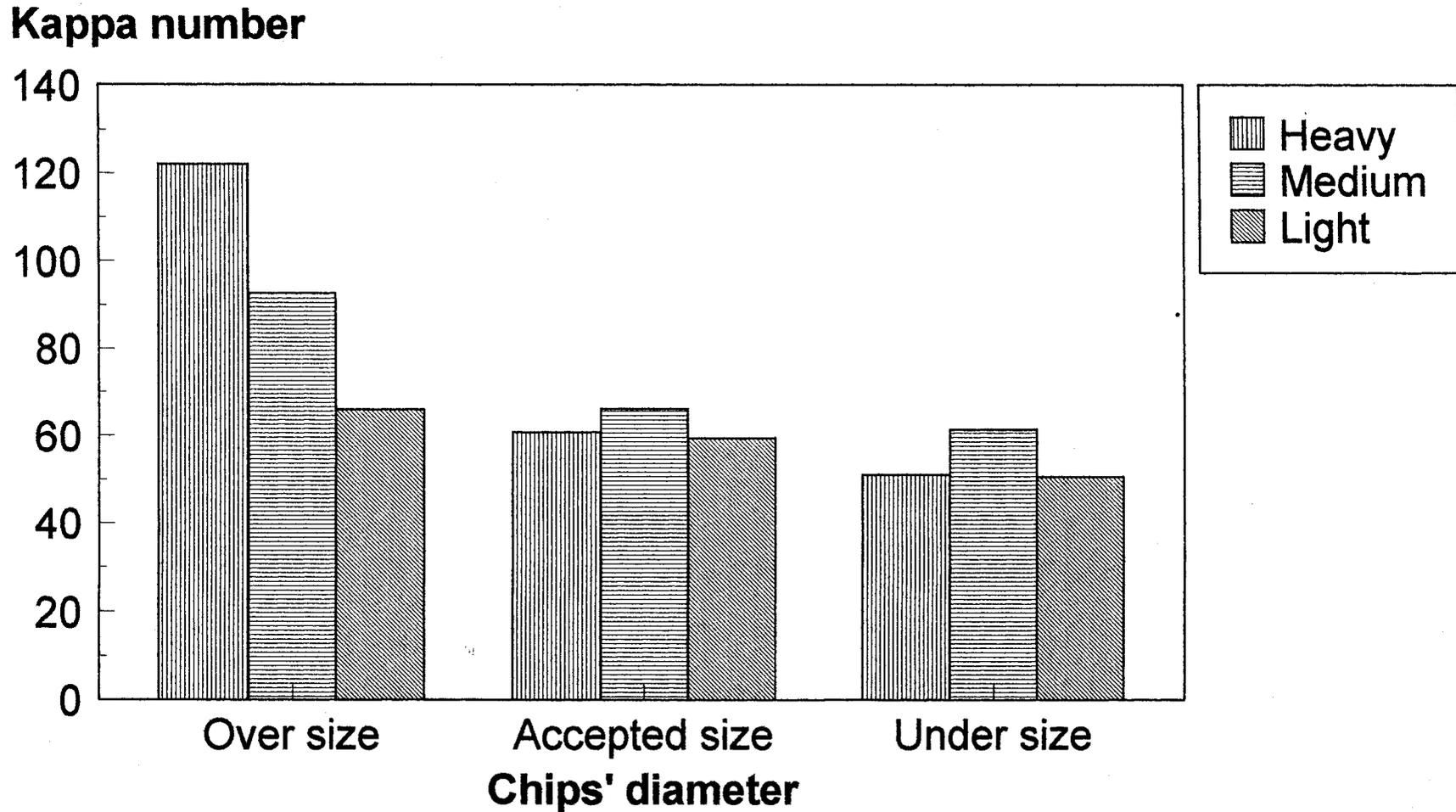
The effect of wood density and chip size on pulp screened yield, kappa number and handsheet properties.

Wood density	Chip's diameter	Yield (%)	Kappa no.	Apparent Density (g/cm ³)	Tensile Index (N.m/g)	Burst Index (kPa.m ² /g)	Folding Endurance	Tear Index (mN.m ² /g)	Scattering Coefficient (cm ² /g)	Opacity (%)
Heavy	Under	22.65	50.9	.38	15.81	2.43	3	2.43	24.61	96.94
Heavy	Accepted	28.15	60.7	.39	12.89	2.08	5	3.85	25.28	98.22
Heavy	Over	16.33	122.0	.33	7.27	2.96	2	2.05	21.70	98.69
Medium	Under	30.04	61.3	.43	12.63	1.82	2	1.15	27.64	98.5
Medium	Accepted	27.39	66.1	.33	8.62	1.94	2	1.53	28.27	98.49
Medium	Over	22.75	92.6	.40	7.14	2.52	2	1.13	26.83	99.45
Light	Under	38.08	50.5	.37	9.47	2.15	2	1.49	23.97	98.32
Light	Accepted	38.89	59.3	.39	10.53	2.21	3	1.78	23.56	97.67
Light	Over	30.74	65.9	.49	11.49	2.68	2	1.62	22.91	97.18

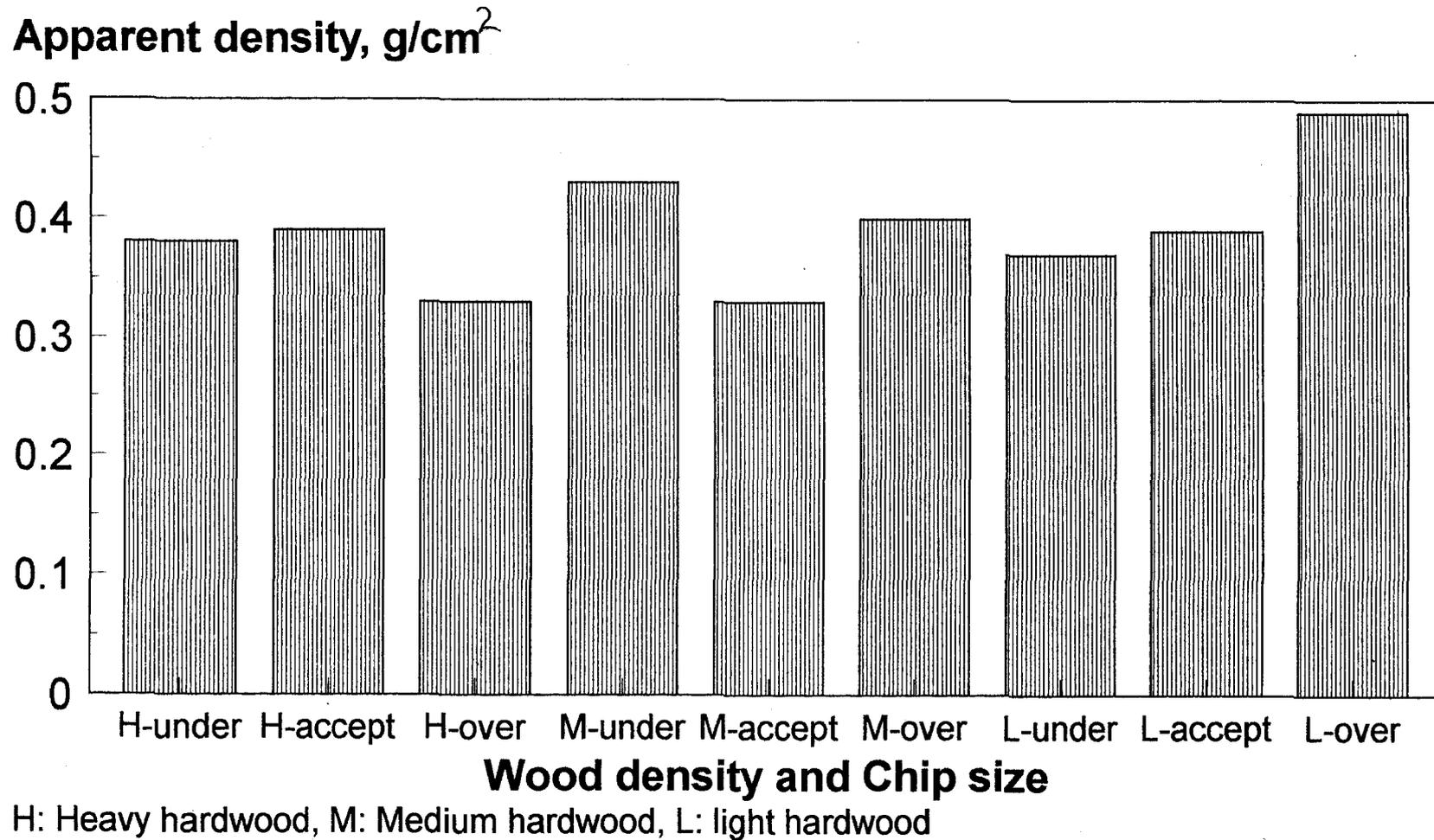
The effect of chips' size of different wood density on pulp screened yield.



The effect of chips' size of different wood density on kappa number.

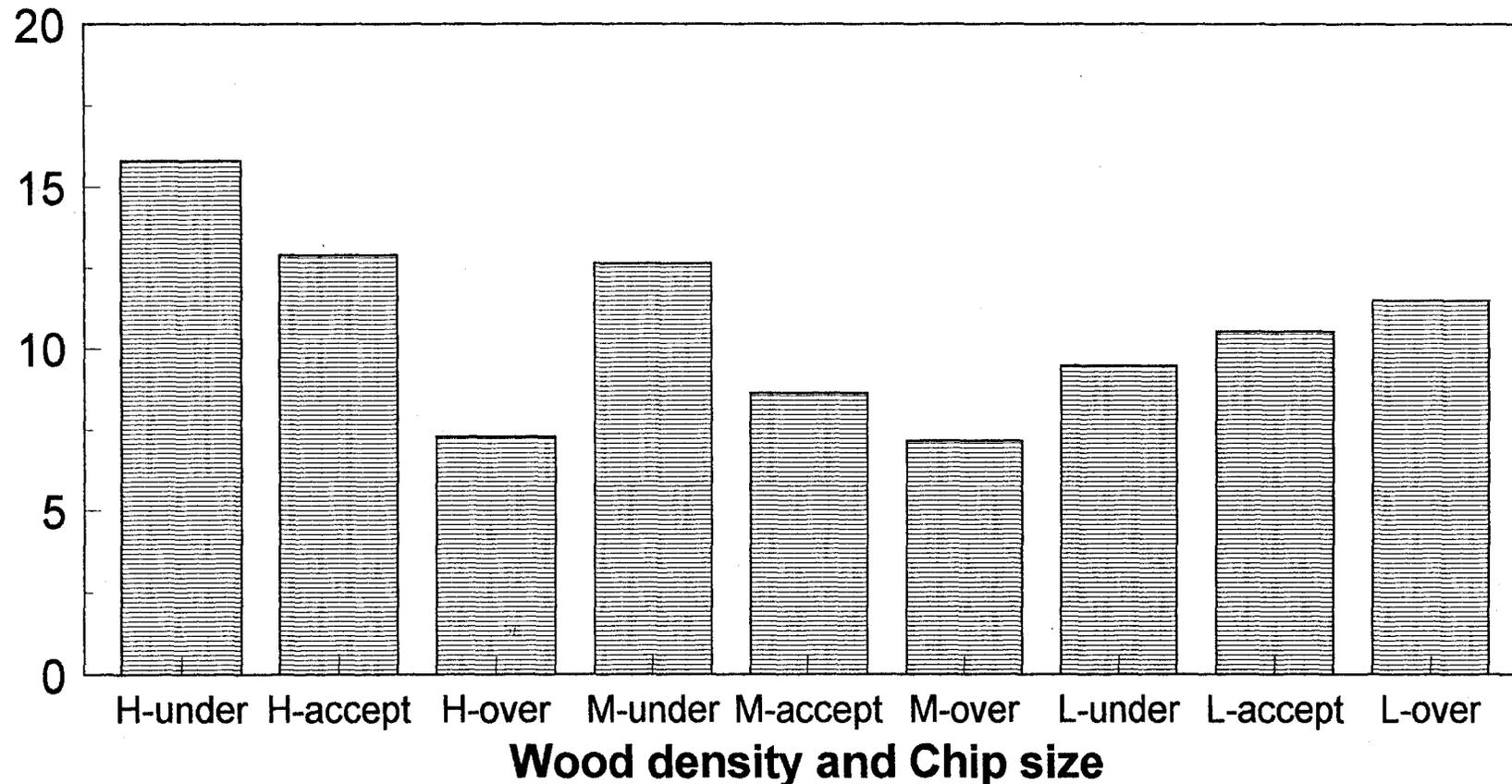


The effect of wood density and chip size on hansheets' apparent density.



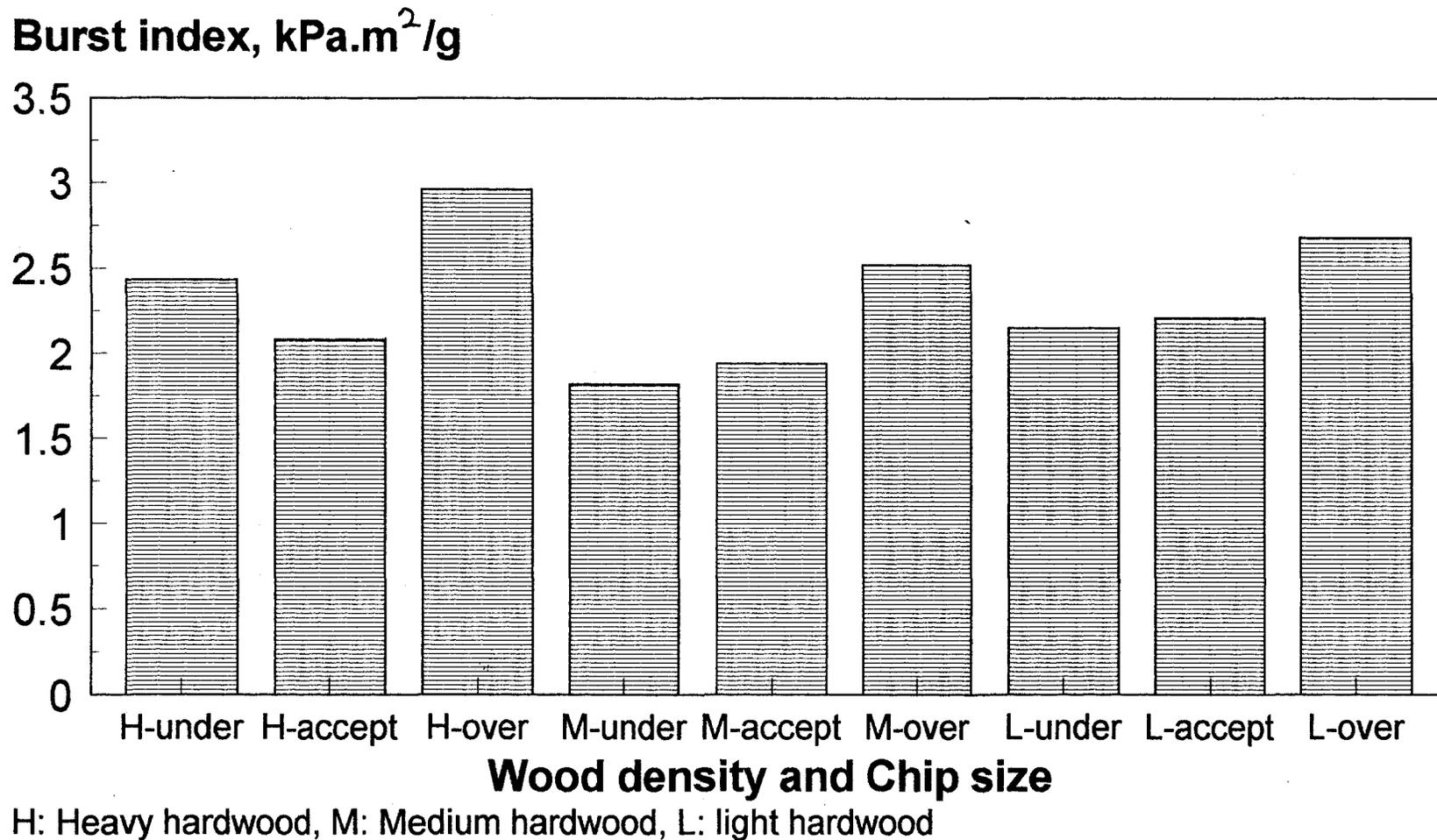
The effect of wood density and chip size on handsheets' tensile index.

Tensile index, N.m /g



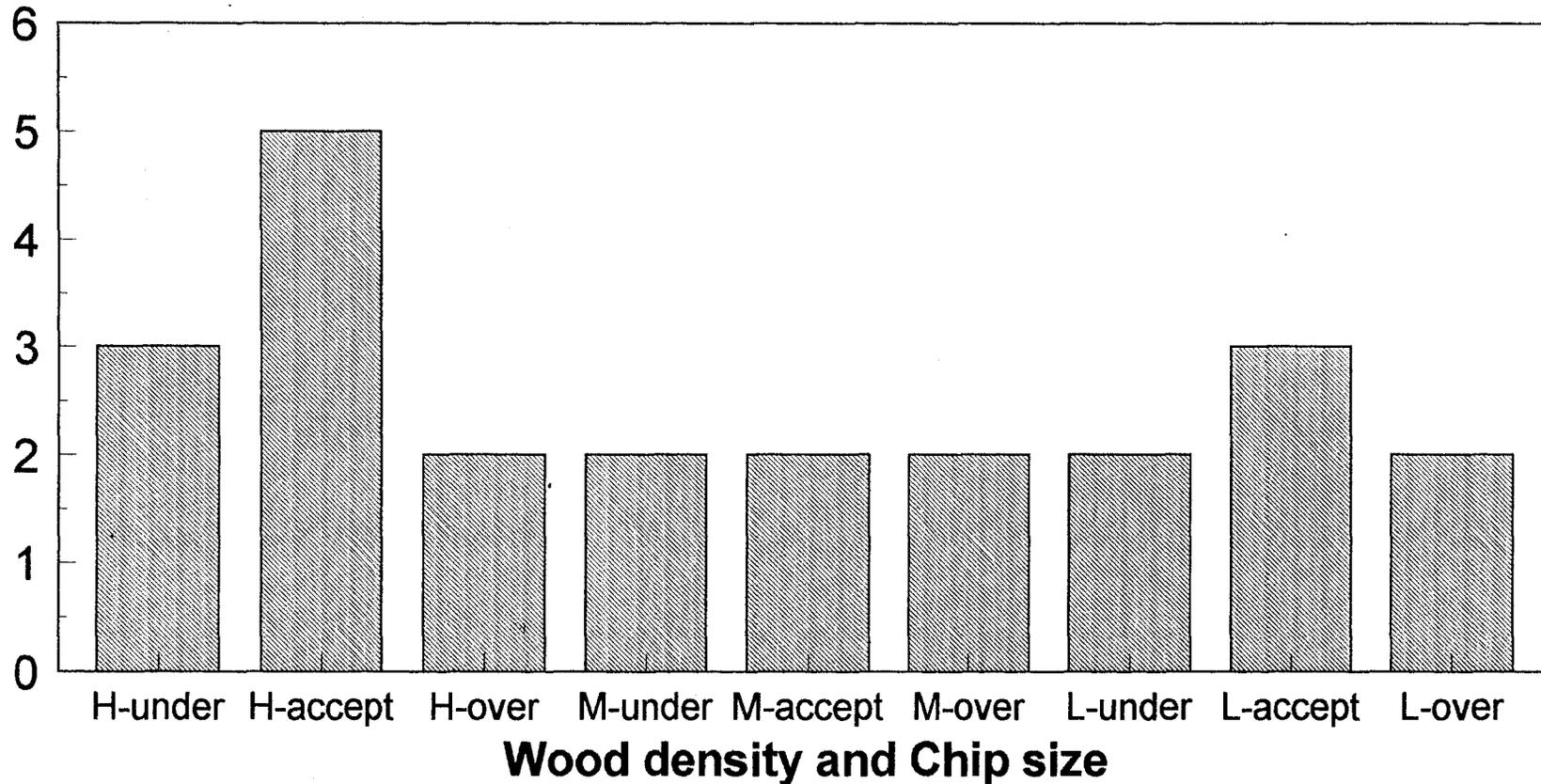
H: Heavy hardwood, M: Medium hardwood, L: light hardwood

The effect of wood density and chip size on handsheets' burst index.



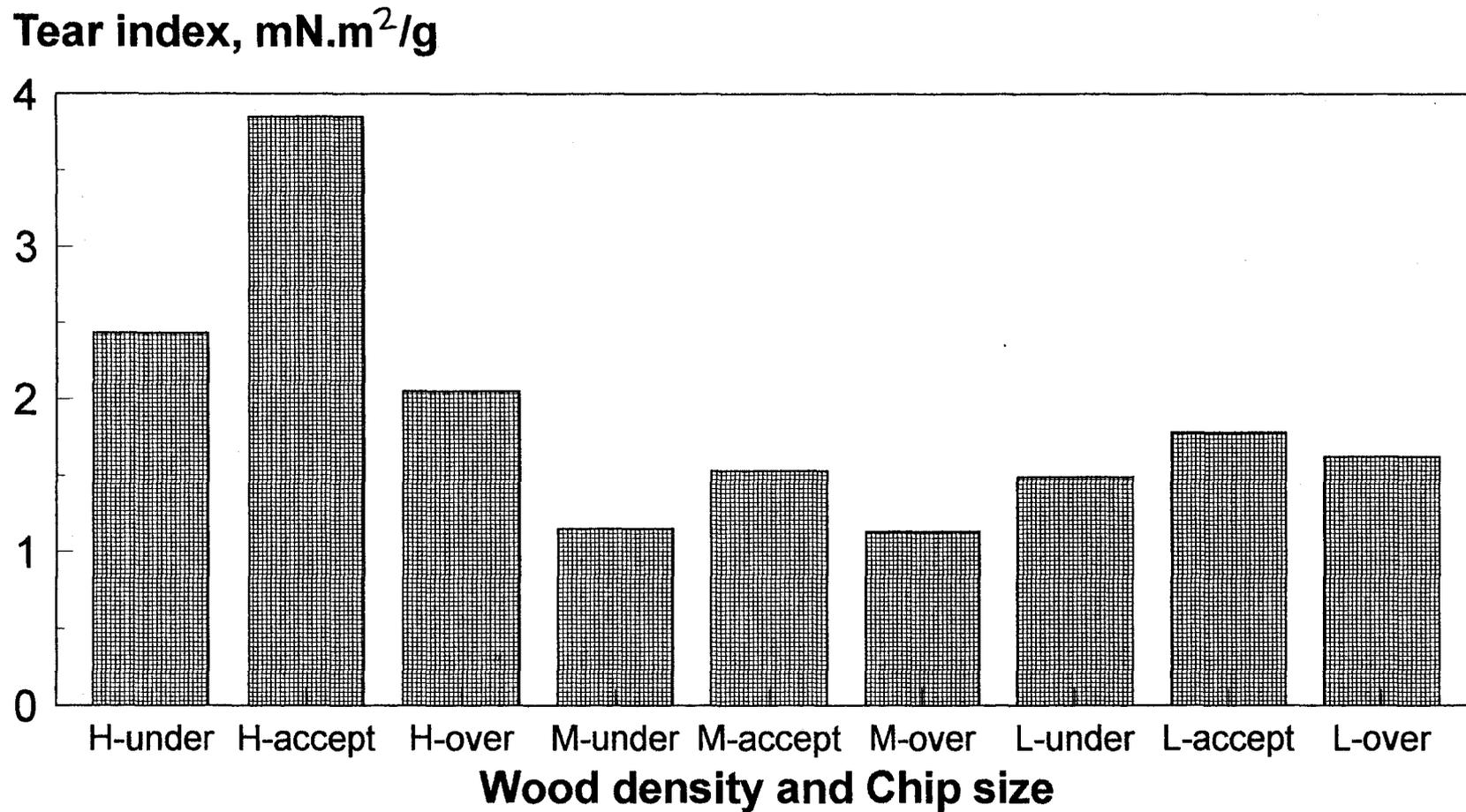
The effect of wood density and chip size on handsheets' folding endurance.

Folding endurance



H: Heavy hardwood, M: Medium hardwood, L: light hardwood

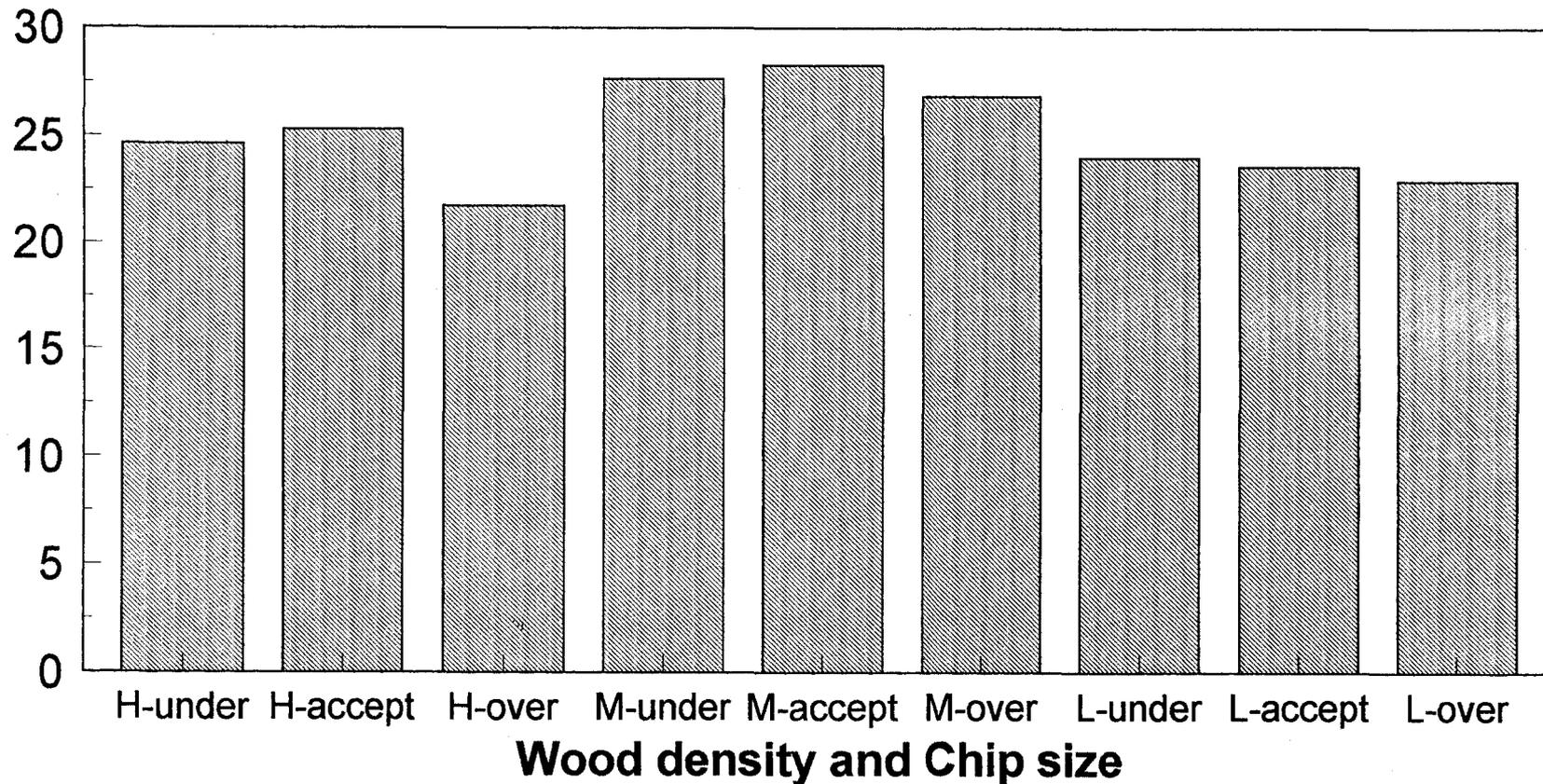
The effect of wood density and chip size on handsheets' tear index.



H: Heavy hardwood, M: Medium hardwood, L: light hardwood

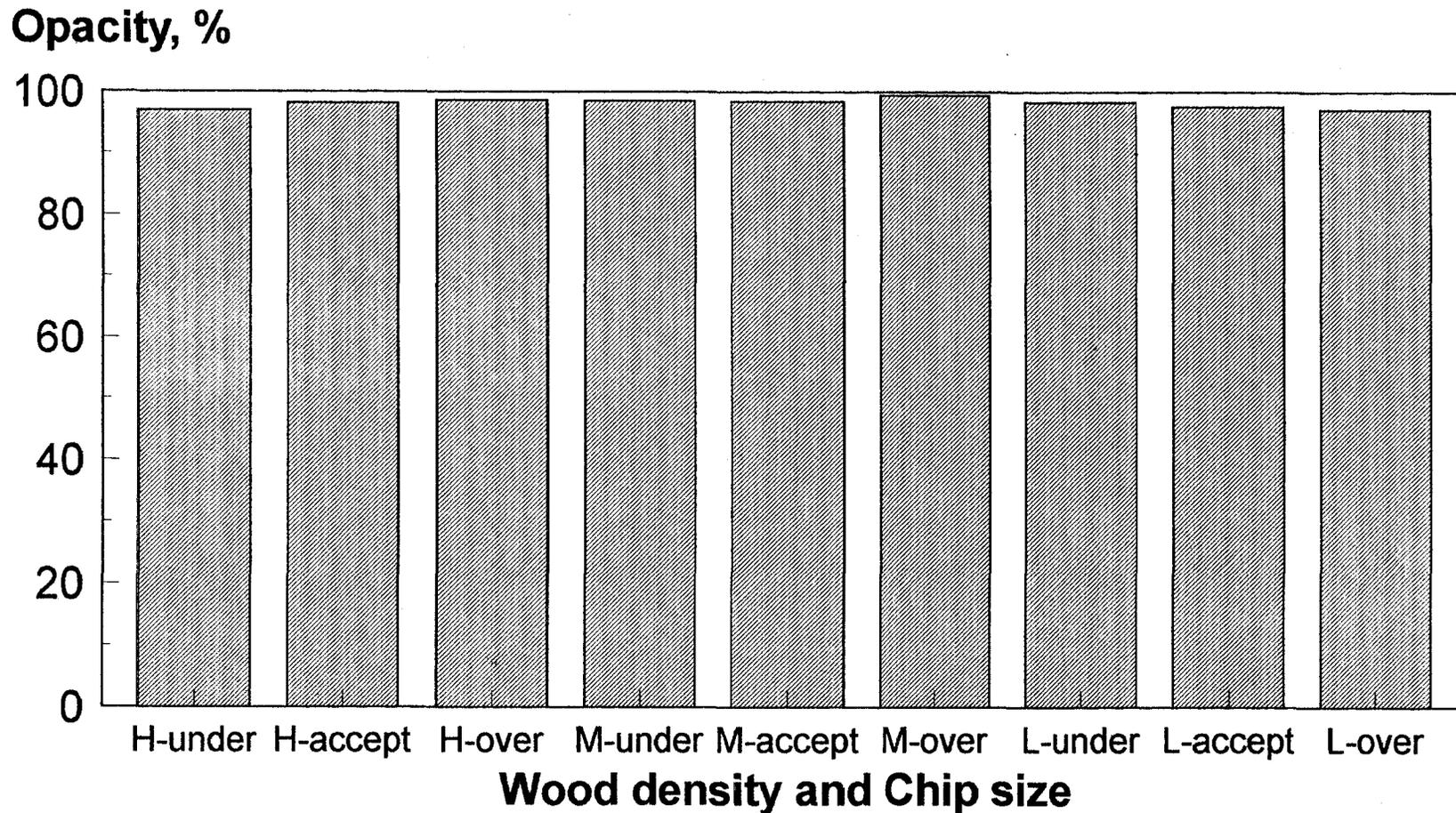
The effect of wood density and chip size on handsheets' light scattering coefficient.

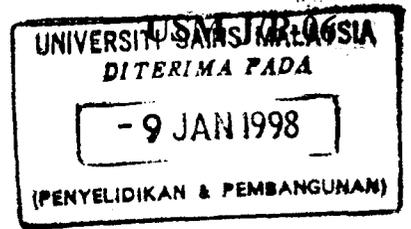
Light scattering coefficient, cm^2/g



H: Heavy hardwood, M: Medium hardwood, L: light hardwood

The effect of wood density and chip size on handsheets' opacity.





BAHAGIAN PENYELIDIKAN & PEMBANGUNAN
CANSELORI
UNIVERSITI SAINS MALAYSIA

Laporan Akhir Projek Penyelidikan Jangka Pendek

1) Nama Penyelidik: DR. RUSHDAN BIN IBRAHIM.....

Nama Penyelidik-Penyelidik
Lain (Jika berkaitan) :

Fateh Khan
Mutak Huda
MP
9/1/98

2) Pusat Pengajian/Pusat/Unit : TEKNOLOGI INDUSTRI / TEKNOLOGI KAYU, KERTAS & PENGLITUP

3) Tajuk Projek: THE EFFECT OF WOOD CHIP AND COOKING CONTROL ON YIELD AND BLEACHABILITY OF MALAYSIAN TROPICAL HARWOOD KRAFT PULP.
(131/0230/0490)

4) (a) **Penemuan Projek/Abstrak**

(Perlu disediakan maklumat di antara 100 - 200 perkataan di dalam Bahasa Malaysia dan Bahasa Inggeris. Ini kemudiannya akan dimuatkan ke dalam Laporan Tahunan Bahagian Penyelidikan & Pembangunan sebagai satu cara untuk menyampaikan dapatan projek tuan/puan kepada pihak Universiti).

Ketumpatan kayu dan saiz serpih mempengaruhi sifat pulpa kraf. Saiz serpih bergantung kepada sifat kayu dan proses penyediaannya. Belum ada penyelidikan dijalankan mengenai kesan ketumpatan kayu dan saiz serpih kayu keras tropikal Malaysia keatas pemulpaan kraf. Dalam penyelidikan ini, kesan ketumpatan kayu, kandungan lembapan dan panjang suapan kayu keatas penghasilan serpih dan penggunaan serpih-serpih ini dalam pemulpaan kraf dari tiga spesis kayu keras tropikal Malaysia dijalankan. Serpih dihasilkan dengan menggunakan penyerpih "drum". Skrin bergetar digunakan untuk memisahkan serpih mengikut saiz diameter. Ketebalan serpih pula diukur dengan menggunakan kaliper. Serpih-serpih ini kemudiannya dipulpa dengan pemulpaan kraf. Hasil penyelidikan ini mendapati ketumpatan kayu, kandungan lembapan dan panjang suapan kayu mempengaruhi saiz serpih dan kuantiti penerimaan untuk pemulpaan kraf. Ketebalan serpih berkadar dengan diameter serpih. Ketumpatan kayu dan saiz serpih mempengaruhi hasil pulpa terskrin, keboleh lunturan dan sifat kertas makmal. Hasil terskrin meningkat apabila ketumpatan kayu menurun. Keboleh lunturan pulpa menurun apabila saiz serpih meningkat. Kesan terhadap sifat kertas makmal bergantung kepada ketumpatan kayu dan saiz serpih. Secara amnya, kayu keras berat mempunyai sifat mekanik yang lebih tinggi berbanding dengan kayu keras sederhana atau ringan.

Wood density and chip size has an effect on the quality of kraft pulp. The chips' size is affected by wood quality and processing it undergone. No study on the effect of wood density and chip size of Malaysian tropical hardwood on kraft pulping has been made. In this experiment, the effect of wood's density, moisture content and feed length on chips' production and the effect of these chips on kraft pulp production of three Malaysian tropical hardwoods were studied. A drum chipper chipped the woods. Vibrated screens screened these chips into different diameter sizes. Their thickness was measured by calliper. These chips were pulped by kraft pulping. The studies found that wood's density, moisture content and feed length have an effect on chip's distribution size and on the quantity of acceptance chips for kraft pulping. Chip's thickness is related to its diameter. Wood's density and chip size have an effect on screened pulp yield, bleachability and handsheets properties. Screened yield increased as the wood density decreased. The bleachability of pulp decreased as the chip size increased. The effect on handsheets properties varies depends on wood density and its chip size. Generally, heavy hardwood has the highest mechanical properties compared to medium and light hardwoods.

(b) Senaraikan Kata Kunci yang digunakan di dalam abstrak:

<u>Bahasa Malaysia</u>	<u>Bahasa Inggeris</u>
DIAMETER SERPIH	CHIP DIAMETER
HASIL	YIELD
KANDUNGAN LEMBAPAN	MOISTURE CONTENT
KAYU KERAS TROPICAL MALAYSIA	MALAYSIAN TROPICAL HARDWOOD
KEBOLEH LUNTURAN	BLEACHABILITY
KETEBALAN SERPIH	CHIP THICKNESS
KETUMPATAN KAYU	WOOD DENSITY
PANJANG SUAPAN	FEED LENGTH
PEMULPAAN KRAFT	KRAFT PULPING
SIFAT KERTAS MAKMAL	HANDSHEET PROPERTIES

5) Output Dan Faedah Projek

(a) Penerbitan (*termasuk laporan/kertas seminar*)

(Sila nyatakan jenis, tajuk, pengarang, tahun terbitan dan di mana telah diterbit/dibentangkan).

- DUA KERTAS SEMINAR AKAN DITERBITKAN:
- I. THE EFFECT OF MALAYSIAN TROPICAL HARDWOOD'S PROPERTIES ON CHIP'S SIZE DISTRIBUTION AND ACCEPTANCE FOR KRAFT PULPING.
 - II. THE EFFECT OF MALAYSIAN TROPICAL HARDWOOD'S DENSITY AND CHIP'S SIZE ON THE PULP YIELD, BLEACHABILITY AND HANDSHEET PROPERTIES OF KRAFT PULP.
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- (b) Faedah-Faedah Lain Seperti Perkembangan Produk,
Prospek Komersialisasi Dan Pendaftaran Paten.
(Jika ada dan jika perlu, sila gunakan kertas berasingan)

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- (c) Latihan Gunatenaga Manusia

i) Pelajar Siswazah

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ii) Pelajar Prasiswazah: 2 ORANG

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iii) Lain-Lain :

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