UNIVERSITI PUTRA MALAYSIA

KNOWLEDGE, ATTITUDE AND PRACTICE OF PESTICIDE USE AMONG MANAGEMENTS AND SPRAYERS AT THREE SELECTED AGRICULTURE INDUSTRIES

NURUL AMIRAH BINTI JAMILUDDIN

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KNOWLEDGE, ATTITUDE AND PRACTICE OF PESTICIDE USE AMONG MANAGEMENTS AND SPRAYERS AT THREE SELECTED AGRICULTURE INDUSTRIES.

By

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APPENDIX 1

Subject information sheet

(Bahasa Malaysia)

JAWATANKUASA ETIKA UNIVERSITI UNTUK
PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA,43400 UPM SERDANG
SELANGOR,MALAYSA

BORANGB1:PENERANGANDANPERSETUJUANRESPONDEN

Sila baca maklumat berikut dengan teliti. Sekiranya anda mempunyai sebarang pertanyaan, sila kemukakan kepada penyelidik.

1.TAJUKKAJIAN

Pengetahuan, sikap dan amalan penggunaan racun perosak di kalangan pengurusan dan penyembur di tiga industry pertanian terpilih.

2. PENGENALAN

Kajian ini adalah tentang tahap pengetahuan, sikap dan amalan penggunaan racun perosak oleh penyembur dan pihak pengurusan tentang racun perosak. Kajian ini dilakukan adalah untuk menilai sejauh mana tahap pengetahuan pekerja dan pihak pengurusan yangn menggunakan racun perosak, sikap serta amalan penggunaan racun perosak.Racun perosak adalah bahan kimia yang digunakan untuk menghapuskan atau mengawal pelbagai makhluk perosak pertanian yang boleh merosakkan tanaman dan ternakan dan mengurangkan produktiviti ladang.

3. APAKAHYANGPERLUANDALAKUKAN?

Anda telah terpilih untuk menjadi salah satu responden dalam kajian ini. Anda hanya perlu menandatangani boring peserta responden selepas membaca dan memahami huraian ini. Borang ini perlulah di kembalikan kepada penyelidik sebelum menjalankan apa-apa ujian. selepasitu, anda Cuma perlu lengkapkan kajian soal selidik ini.

4. SIAPAYANGTIDAKBOLEHMENYERTAIKAJIANINI?

Pekerja ladang yang tidak pernah menggunakan racun dan perempuan yang mengandung. Selain itu pekerja yang bawah umur 18 tahun tidak boleh menyertai kajian ini.

5. APAKAHFAEDAHMENYERTAIKAJIANINI?

a) KEPADAANDASEBAGAIPESERTA?

Mendapat kesedaran betapa pentingnya langkah keselamatan semasa terlibat dengan racun perosak

b) KEPADAPENYELIDIK?

Mengetahui tahappengetahuan, sikap dan amalan serta perbezaan pengurusan antara tiga jenis ladang.

6. ADAKAHIABERISIKO?

Tidak

7. ADAKAHMAKLUMATDANIDENTITISAYAKEKALRAHSIA?

Ya, semua maklumt mengenai responden telah dijamin rahsia dan sulit

8. SIAPAYANGSAYAPERLUHUBUNGISEKIRANYASAYAMEMPUNYAISOALANTAMBAHANSEMAS AMENGIKUTIPENYELIDIKANINI?

Sebarang masalah atau soalan semasa kajian ini dijalankan boleh diajukan kepada penyelidik, Nurul Amirah binti Jamiluddin ,atau melalui telefon bimbit, 0134483937

9. PERSETUJUAN

Saya..... No Kad Pengenalan.
.....beralamat.....
.....
.....dengan ini bersetuju untuk mengambil bahagian secara sukarela dalam penyelidikan yang tersebut diatas*(kajian klinikal/percubaan ubat-ubatan/ rakaman video /kumpulan sasaran/temuduga/soalselidik).

Saya telah diberi penjelasan secara menyeluruh mengenai penyelidikan ini dari segi metodologi,risiko dan komplikasi (seperti tertulis pada Helaian Penerangan Responden) .Saya memahami bahawa saya berhak menarik diri dari penyelidikan ini pada bila-bila masa tanpa member sebarang alasan.Saya juga memahami bahawa sebarang maklumat yang berkaitan identity saya akan dirahsiakan.

Saya*berminat/tidakberminat untuk mengetahui keputusan kajian yang melibatkan saya.

I setuju/tidak bersetuju untuk imei /gambar /rakaman video /rakaman suara digunakan dalam apa jua bentuk penerbitan atau pembentangan.(sekiranyaberkaitan).

*potongyangtidakberkenaan

Tandatangan.....
(*Responden*)

Tandatangan.....
(*Saksi*)

Tarikh:.....

Nama:.....

No.K/P:.....

Saya mengesahkan bahawa saya telah menerangkan kepada responden inisifat dan tujuan penyelidikan yang tersebut diatas.

Tarikh.....

Tandatangan.....
(*Penyelidik*)

Appendix 2

Questionnaire (Bahasa Malaysia)

Jabatan Kesihatan Persekitaran Dan Pekerjaan

Fakulti Perubatan Dan Sains Kesihatan

Universiti Putra Malaysia

Pengetahuan, Sikap dan Amalan Penggunaan Racun Perosak dalam Kalangan Pengurusan dan Penyebur di Tiga Industri Pertanian Terpilih.

Nama : _____

Telefon : _____

BAHAGIAN PENGURUSAN.

BAHAGIAN A: DATA PERIBADI RESPONDEN

Arahan: Sila lengkapkan semua maklumat dan tandakan [V] pada ruangan yang berkenaan.

A1:

1. Nama : _____

A2:

2. Umur : ☐ tahun

A3:

3. Jantina : lelaki ☐ perempuan ☐

4. No telefon: pejabat : _____
bimbit : _____

A5:

5. Bangsa: ☐ melayu ☐ india
☐ cina ☐ lain-lain (sila nyatakan):

A6:

6. Tahap pendidikan:
☐ Tidak bersekolah
☐ Rendah/ UPSR
☐ Menengah/PMR/SPM/STPM
☐ Tinggi/sijil/Diploma/Ijazah

A7:

7.warganegar: ☐ warganegara ☐ bukan warganegara

BAHAGIAN B: LATAR BELAKANG PEKERJAAN

Arahan: Sila lengkapkan semua maklumat dan tandakan [√] pada ruangan yang berkenaan.

B1:

1. Jawatan anda di dalam organisasi kerja anda: _____

2. klasifikasi bidang agrilkultur bagi organisasi yang anda terlibat:

B2:

☐ Perladangan kelapa sawit
☐ Perladangan nanas
☐ Perladangan getah
☐ Perladangan sayur sayuran
☐ lain-lain (nyatakan): _____

3. Saiz bagi industri yang ceburi: B3:

	multinasional
	industri kecil dan sederhana

4. Jumlah keseluruhan pekerja di dalam organisasi anda (termasuk tetap dan kontrak) B4:

	kurang dari 40 pekerja
	40-100 pekerja
	lebih dari 100 pekerja

BAHAGIAN C: MAKLUMAT TENTANG PENGGUNAAN RACUN PEROSAK

Arahan: Sila lengkapkan semua maklumat dan tandakan [V] pada ruangan yang berkenaan.

1.0) Pengendalian racun perosak

sila tandakan (/)) pada kotak yang berkenaan 1.0

1.1) Adakah latihan pengendalian racun dijalankan ?

Ya ☐ tidak ☐

1.1.1) Jika ya, nyatakan bila? 1.1.1

☐ Sekali sepanjang bekerja
☐ Lebih dua kali sepanjang bekerja
☐ lain-lain: nyatakan:_____

sila tandakan (/)) pada kotak yang berkenaan

Amalan penggunaan	Selalu	Kadang-kadang	Jarang-jarang	Tidak pernah
Sebelum semburan				
1.2) Latihan berkaitan jenis racun perosak				
1.3) Memastikan pekerja memakai sarung tangan dan penutup hidung semasa mencampurkan bahan racun perosak.				
1.4) Sentiasa awasi pekerja membaca label sebelum guna dan ikut arahan				
1.5)Awasi pekerja supaya Periksa alatan dan bahan sebelum digunakan				
1.6) Awasi agar dapat Elakkan manusia dan haiwan berada berdekatan dengan kawasan penyemburan.				
1.7) Memilih racun perosak bukan berdasarkan yang disyorkan				
1.8) Menghidu untuk pastikan racun perosak				
1.9)Membantu Gaul racun menggunakan tangan				
Semasa semburan				
1.10) Memakai boot atau kasut getah				
1.11) Merokok				
1.12) Membantu Sembur racun perosak semasa berangin				
1.13) Berdiri semasa pekerja menyembur arah berlawanan angin dan tidak memakai pakaian lengkap				
Selepas semburan				

1.2:	1.12:
1.3:	1.13:
1.4:	1.14:
1.5:	1.15:
1.6:	1.16:
1.7:	1.17:
1.8:	1.18:
1.9:	1.19:
1.10:	1.20:
1.11:	1.21:

1.14) Memastikan tong racun dibasuh dengan menggunakan air sungai selepas di gunakan				
1.15) Memastikan bekas racun perosak dihapuskan dalam sungai selepas di guna				
1.16) Memastikan alatan yang telah digunakan dibasuh dengan peluntur				
1.17)Memastikan pakaian ditukar selepas semburan racun				
1.18)Memastikan pakaian dibasuh selepas digunakan dengan segera				
1.19)Memastikan racun perosak disimpan di dalam stor selepas digunakan.				
1.20) Memastikan Bekas yang kosong perlu dibakar atau di tanam				
1.21)Memastikan Basuh tangan dan muka sebelum mengambil sebarang makanan.				

2.0) Penyimpanan racun makhluk perosak

sila tandakan (/) ATAU (X) pada setiap kotak yang disediakan

2.1) Stor mempunyai peralatan yang cukup untuk menyukat dan membancuh racun

2.2) Stor mempunyai peralatan kecemasan untuk menangani sebarang tumpahan dan pencemaran

2.3) Menampal prosedur keselamatan berdekatan stor. Prosedur tersebut mestilah mengandungi maklumat penting sekiranya berlaku kecemasan atau kemalangan.

2.4) Berbumbung, kering dan jauh dari punca air bagi mengelakkan risiko pencemaran kepada punca air jika berlaku tumpahan

2.5) Racun-racun makhluk perosak jenis cecair perlu diletakkan di bahagian bawah rak racun makhluk perosak jenis pepejal.

2.6) Mempuyai rekod racun dan kemalangan di tempat kerja yang sentiasa di kemaskini

2.1
2.2
2.3
2.4
2.5
2.6

3.0) Pengurusan bekas racun setelah digunakan

sila tandakan (/)) pada kotak yang berkenaan

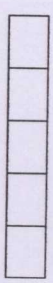
3.1) Menanam

3.2) Membuang

3.3) Menggunakan semula

3.4) Bekas dikumpul dan disimpan

3.5) Hantar ke pusat pelupusan kimia



3.1
3.2
3.3
3.4
3.5

4.0)PERALATAN PERLINDUNGAN DIRI

4.1) Adakah peralatan perlindungan diri di sediakan?

4.1

☐ Ya ☐ tidak

5.0 TINGKAH LAKU

5.1) Jika terkena semburan racun pada mana-mana anggota badan pekerja, apakah yang dilakukan?

5.1

(*Sila tandakan (/) pada salah satu kotak yang berkenaan)*

a) Mengarahkan pekerja membasuh mana-mana anggota badan yang terkena dengan air bersih ☐

b) Menasihatkan agar pulang ke rumah ☐

c)Membawa pekerja ke klinik ☐

d) Tidak buat apa-apa ☐

e) lain-lain:nyatakan:_____ ☐

Sila tandakan (/) pada salah satu kotak yang berkenaan)

Item tingkah laku	Sangat setuju	Setuju	Tidak tahu	Tidak bersetuju	Sangat tidak bersetuju
5.2) Memasukkan racun perosak kedalam mulut boleh dikategorikan sebagai membunuh diri					
5.3) Mencampurkan berbagai racun akan meningkatkan keberkesanan dan tiada keburukan					
5.4) Berdiri bertentangan angin semasa semburan tanpa memakai peralatan perlindungan diri boleh menyebabkan keracunan.					
5.5) Minum air kelapa selepas terkena racun adalah baik untuk menyahtoksinkan racun dalam tubuh kita					
5.6) Minum air mineral penting selepas terdedah kepada racun perosak					
5.7) Pemilihan penggunaan bahan kimia yang mahal lebih effektif berbanding bahan kimia yang murah					
5.8) Apabila menyembur racun , tidak memakai pakaian perlindungan diri yang lengkap boleh menyebabkan keracunan.					
5.9) Jika sembur racun perosak tanpa sebarang peralatan perlindungan diri,hendaklah mandi secepatnya selepas					

5.2
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5.12
5.13
5.14

sembur sebagai langkah berjaga-jaga.					
5.10) Senaman boleh keluarkan toksik melaui peluh					
5.11) Gunakan racun perosak dengan jumlah yang banyak akan meningkatkan jumlah produk.					
5.12) Menyembur racun perosak akan melekat pada hasil tanaman dan bahayakan pengguna					
5.13) Gunakan batang kayu untuk campurkan racun lebih selamat daripada menggunakan tangan					
5.14) Racun perosak bahaya kepada alam sekitar dan manusia.					

6.0 PENGETAHUAN

Menilai Tahap Pengetahuan Terhadap Racun Perosak

sila tandakan (/)) pada setiap kotak yang disediakan

Item pengetahuan	YA	TIDAK	TIDAK TAHU
6.1) Racun perosak boleh mengakibatkan masalah kesihatan			
6.2) Racun perosak boleh membunuh haiwan ternakan			
6.3) Racun perosak boleh memusnahkan tumbuhan			
6.4) Jangka masa mendapat simptom dalam 24 jam			
6.5) Perlu mengambil kira waktu yang sesuai untuk menggunakan racun perosak			
6.6) Kaedah kemasukan racun perosak ke dalam badan melalui pernafasan			
6.7) Kaedah kemasukan racun perosak ke dalam badan melalui kulit			
6.8) Kaedah kemasukan racun perosak ke dalam badan melalui mulut			
6.9)Racun rumpai sebaiknya di asingkan daripada racun-racun yang lain			
6.10) Untuk penanaman bekas racun perosak, gali lubang sedalam 0.5-1 meter dan kedudukn lubang melebihi jarak 30 meter dari punca air			
6.11) Sekiranya berlaku tumpahan racun makhluk perosak, hendaklah alihkan tumpahan dengan menggunakan bahan penyerap seperti habuk papan atau pasir.			
6.12) Mempunyai tempoh larangan mengutip hasil apabila racun perosak di gunakan			
6.13) Perlu mengambil tahu arah tiupan angin dn keadaan cuaca sebelum penyembur racun perosak			
6.14) Perlu mengasingkan baju yang dipakai semasa bekerja dengan racun perosak			
6.15) Penggunaan peralatan perlidungan diri boleh mengurangkan pendedahan kepada keracunan			

6.1
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6.13
6.14
6.15

SOAL SELIDIK PEKERJA LADANG

BAHAGIAN A: DATA PERIBADI RESPONDEN

Arahan: Sila lengkapkan semua maklumat dan tandakan [V] pada ruangan yang berkenaan.

1. Nama : _____ A1:

2. Umur : ☐ tahun A2:

3. Jantina : lelaki ☐ perempuan ☐ A3:

4. No telefon: pejabat : _____
bimbit : _____

5. Bangsa: ☐ melayu ☐ india
☐ cina ☐ lain-lain (sila nyatakan): A5:

6. Tahap pendidikan: A6:
☐ Tidak bersekolah
☐ Rendah/ UPSR
☐ Menengah/PMR/SPM/STPM
☐ Tinggi/sijil/Diploma/Ijazah

7.warganegar: ☐ warganegara ☐ bukan warganegara A7:

BAHAGIAN B: LATAR BELAKANG PEKERJAAN

Arahan: Sila lengkapkan semua maklumat dan tandakan [V] pada ruangan yang berkenaan.

1. Nyatakan jenis bidang pekerjaan anda sekarang ini B1:

☐ Kelapa sawit
☐ Nanas
☐ Getah
☐ Sayur
☐ Lain-lain: _____

2. Nyatakan tugasan anda sekarang?

B2:

- ☐ Penyediaan tapak
- ☐ Penyemaian
- ☐ Penanaman
- ☐ Penjagaan tanaman
- ☐ Penoreh
- ☐ Pegumpul hasil
- ☐ Pemilihan hasil
- ☐ Pembungkusan
- ☐ Pemandu lori/traktor/forklift

3. Tempoh pengalaman anda bekerja dalam bidang ini: _____ tahun/bulan

B3:

4. Adakah anda sedar dengan kewujudan bahagian pengurusan keselamatan di sini:

B4:

- ☐ Ya
- ☐ Tidak

5. Adakah peralatan perlindungan diri diberikan di tempat kerja anda?

B5:

- ☐ Ya
- ☐ Tidak

6. Jika ya, adakah anda menggunakan sebarang peralatan yang telah diberikan?

B6:

- ☐ Ya
- ☐ Tidak

7. Sila tandakan jenis peralatan yang anda gunakan:

- ☐ Topi keselamatan
- ☐ Kasut keselamatan
- ☐ Cermin mata keselamatan
- ☐ Sarung tangan
- ☐ Pakaian perlindungan diri
- ☐ Topeng keselamatan
- ☐ Lain-lain (nyatakan): _____

B7.1:	B7.5:
B7.2:	B7.6:
B7.3:	B7.7:
B7.4:	

BAHAGIAN D: MAKLUMAT TENTANG PENGGUNAAN RACUN PEROSAK

Arahan: Sila lengkapkan semua maklumat dan tandakan [√] pada ruangan yang berkenaan.

1. AMALAN PENGGUNAAN

Pengendalian racun perosak

sila tandakan (/)) pada kotak yang berkenaan

1.1) Adakah latihan pengendalian racun dijalankan ?

Ya ☐ tidak ☐

D1.1:

1.1.1) Jika ya, nyatakan bila?

☐ Sekali sepanjang bekerja
☐ Lebih dua kali sepanjang bekerja
☐ lain-lain: nyatakan:_____

D1.1.1:

(sila tandakan (/) pada kotak berkenaan)

Amalan penggunaan	Selalu	Kadang-kadang	Jarang-jarang	Tidak pernah
Sebelum semburan				
1.2) Latihan berkaitan jenis racun perosak				
1.3) Pakai sarung tangan dan penutup hidung semasa mencampurkan bahan racun perosak.				
1.4) Baca label sebelum guna dan ikut arahan				
1.5) Periksa alatan dan bahan sebelum digunakan				
1.6)Elakkan manusia dan haiwan berada berdekatan dengan kawasan penyemburan.				
1.7)Memilih racun				

D1.2:	D1.12:
D1.3:	D1.13:
D1.4:	D1.14:
D1.5:	D1.15:
D1.6:	D1.16:
D1.7:	D1.17:
D1.8:	D1.18:
D1.9:	D1.19:
D1.10:	D1.20:
D1.11:	D1.21:

perosak seperti yang disyorkan.				
1.8) Menghidu untuk pastikan benar racun perosak				
1.9) Gaul racun menggunakan tangan				
Semasa semburan				
1.10) Memakai but/kasut getah				
1.11) Merokok				
1.12) Sembur racun perosak semasa berangin				
1.13) Berdiri semasa menyembur arah berlawanan angin dan tidak memakai pakaian lengkap				
Selepas semburan				
1.14) Membersihkan bekas tong racun dengan menggunakan air sungai selepas di gunakan				
1.15) Hapuskan bekas racun perosak di dalam sungai selepas di guna				
1.16) Membersihkan alatan yang telah digunakan dengan peluntur				
1.17) Menukar pakaian yang digunakan semasa sembur racun				
1.18)Membasuh pakaian selepas digunakan dengan segera				
1.19) Menyimpan racun perosak di dalam stor selepas digunakan.				
1.20) Bekas yang kosong perlu dibakar atau di tanam				
1.21) Basuh tangan dan muka sebelum mengambil sebarang makanan.				

2.1) Peralatan Perlindungan Diri

Adakah peralatan perlindungan diri di sediakan?

Ya ☐ tidak ☐

D2.1:

Nyatakan peralatan pelindung diri yang dipakai semasa mengendalikan racun makhluk perosak

sila tandakan (/) ATAU (X) pada setiap kotak yang disediakan

2.2 Semasa mengangkut

2.2.1) sarung tangan getah ☐

2.2.2) apron plastik ☐

2.2.3) kasut (but) ☐

D2.2.1 :
D2.2.2:
D2.2.3:

2.3 Semasa membancuh

2.3.1) sarung tangan getah ☐

2.3.2) penutup mulut-hidung ☐

2.3.3)pelindung mata (goggle) ☐

2.3.4) baju lengan panjang ☐

2.3.5) seluar panjang ☐

2.3.6)kasut but ☐

2.3.7) apron plastik ☐

D2.3.1:	D2.3.5:
D2.3.2:	D2.3.6:
D2.3.3:	D2.3.7
D2.3.4:	

2.4) Semasa menyembur

2.4.1) sarung tangan getah

2.4.2) penutup mulut-hidung

2.4.3)pelindung mata (goggle)

2.4.4) baju lengan panjang

2.4.5) seluar panjang

2.4.6)kasut but getah

2.4.7) apron plastik

2.4.8) topi

D2.4.1:	D2.4.5:
D2.4.2:	D2.4.6:
D2.4.3:	D2.4.7:
D2.4.4:	D2.4.8:

2.5) Semasa mencuci alat penyembur

2.5.1) sarung tangan getah

2.5.2) baju lengan panjang

2.5.3) seluar panjang

2.5.4) Kasut but getah

2.5.5) apron plastik

D2.5.1	D2.5.4:
D2.5.2:	D2.5.5:
D2.5.3:	

3.0 TINGKAH LAKU

(sila tandakan (/) pada kotak berkenaan)

Item tingkah laku	Sangat setuju	Setuju	Tidak tahu	Tidak bersetuju	Sangat tidak bersetuju
3.1) Memasukkan racun perosak kedalam mulut boleh dikategorikan sebagai membunuh diri					
3.2) Mencampurkan berbagai racun akan meningkatkan keberkesanan dan tiada keburukan					
3.3) Berdiri bertentangan angin semasa semburan tanpa memakai peralatan perlindungan diri boleh menyebabkan keracunan.					
3.4) Minum air kelapa selepas terkena racun adalah baik untuk menyahtoksinkan racun dalam tubuh kita					
3.5) Minum air mineral penting selepas terdedah kepada racun perosak					
3.6) Pemilihan penggunaan bahan kimia yang mahal lebih berkesan berbanding bahan kimia yang murah					
3.7) Apabila menyembur racun , tidak memakai pakaian perlindungan diri yang lengkap boleh menyebabkan keracunan					
3.8) Jika sembur racun perosak tanpa sebarang peralatan perlindungan					

D3.1:
D3.2:
D3.3:
D3.4:
D3.5:
D3.6:
D3.7:
D3.8:
D3.9:
D3.10:
D3.11:
D3.12:
D3.13:

diri,hendaklah mandi secepatnya selepas sembur sebagai langkah berjaga-jaga.					
3.9) Senaman boleh keluarkan toksik melaui peluh					
3.10) Gunakan racun perosak dengan jumlah yang banyak akan meningkatkan jumlah produk.					
3.11) Menyembur racun perosak akan melekat pada hasil tanaman dan bahayakan pengguna					
3.12) Gunakan batang kayu untuk campurkan racun lebih selamat daripada menggunakan tangan					
3.13) Racun perosak bahaya kepada alam sekitar dan manusia.					

4.0 PENGETAHUAN

Menilai Tahap Pengetahuan Terhadap Racun Perosak

sila tandakan (/)) pada setiap kotak yang disediakan

Item Pengetahuan	YA	TIDAK	TIDAK TAHU
4.1) Racun perosak boleh mengakibatkan masalah kesihatan			
4.2) Racun perosak boleh membunuh haiwan ternakan			
4.3) Racun perosak boleh memusnahkan tumbuhan			
4.4) Jangka masa mendapat simptom dalam 24 jam			
4.5) Perlu mengambil kira waktu yang sesuai untuk menggunakan racun perosak			
4.6) Kaedah kemasukan racun perosak ke dalam badan melalui pernafasan			
4.7) Kaedah kemasukan racun perosak ke dalam badan melalui kulit			

D4.1:	D4.9:
D4.2:	D4.10:
D4.3:	D4.11:
D4.4:	D4.12:
D4.5:	D4.13:
D4.6:	D4.14:
D4.7:	D4.15:
D4.8:	D4.16:

4.8) Kaedah kemasukan racun perosak ke dalam badan melalui mulut			
4.9) Racun rumpai sebaiknya di asingkan daripada racun-racun yang lain			
4.10) Untuk penanaman bekas racun perosak, gali lubang sedalam 0.5-1 meter dan kedudukn lubang melebihi jarak 30 meter dari punca air			
4.11) Sekiranya berlaku tumpahan racun makhluk perosak, hendaklah alihkan tumpahan dengan menggunakan bahan penyerap seperti habuk papan atau pasir.			
4.12) Mempunyai tempoh larangan mengutip hasil apabila racun perosak di gunakan			
4.13) Perlu mengambil tahu arah tiupan angin dn keadaan cuaca sebelum penyembur racun perosak			
4.14) Perlu mengasingkan baju yang dipakai semasa bekerja dengan racun perosak			
4..15)Terdapat dua jenis kesan keracunan racun perosak iaitu akut dan kronik			
4.16)Penggunaan peralatan perlidungan diri boleh mengurangkan pendedahan kepada keracunan			

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ABSTRAK

PENGETAHUAN, SIKAP DAN AMALAN PENGGUNAAN RACUN MAKHLUK PEROSAK DI KALANGAN PENGURUSAN DAN PENYEMBUR DI TIGA PERTANIAN INDUSTRITERPILIH

NURUL AMIRAH BINTI JAMILUDDIN

Latar Belakang: Kajian ke atas Pengetahuan, Sikap dan Amalan (KAP) menunjukkan penggunaan racun perosak yang tidak selamat adalah perkara biasa di negara-negara membangun. Kajian ini memberi tumpuan kepada getah , nanas dan sayur-sayuran perladangan. Satu kajian menunjukkan bahawa keracunan berlaku di 14.5 % di kalangan 4,531 petani di Cameron Highlands .Satu laporan baru-baru ini oleh Jabatan Keselamatan dan Kesihatan Pekerjaan mendedahkan bahawa kadar kemalangan pengendalian racun perosak yang tidak betul adalah empat kali lebih tinggi berbanding dengan kerja-kerja pertanian yang lain.**Metodologi:** Satu kajian irisan lintang telah dijalankan untuk menentukan pengetahuan, sikap dan amalan penggunaan racun perosak di kalangan pengurusan dan penyembur racun perosak pada tiga industri terpilih pertanian iaitu getah , nanas dan sayur-sayuran perladangan. Satu ratus lima puluh orang responden telah dipilih menggunakan kaedah persampelan bertujuan di tiga kawasan ladang yang berbeza , di mana setiap industri terdiri daripada 10 pekerja pengurusan dan 40 pengendali racun perosak. Soal selidik terdiri daripada 5 bahagian utama iaitu demografi sosio , sikap , amalan, peralatan perlindungan diri dan pengetahuan. Setiap bahagian sikap, amalan dan pengetahuan dikira berdasarkan setiap skala Likert-jenis. Data yang diperolehi telah digunakan untuk menentukan peratusan dan min untuk pengetahuan , sikap dan amalan bagi setiap kawasan. Ujian Chi Kuasa Dua telah digunakan untuk menentukan perbezaan antara KAP ubah dengan penggunaan PPE dan Anova ujian telah digunakan untuk membandingkan kajian KAP di kalangan penyembur racun perosak dan pengurusan . Kebolehpercayaan hasil menunjukkan ketekalan dalaman yang tinggi (pekali cronbach alpha = 0,966).**Keputusan**: Kajian ini menunjukkan bahawa penyembur racun perosak nanas mempunyai skor min tertinggi (65,31 %) diikuti oleh getah (62,79 %) dan sayur-sayuran (62.42%).Walau bagaimanapun, tidak terdapat sebarang perbezaan yang signifikan ($p>0.05$) bagi amalan yang baik dan sikap antara penyembur dan tiga kawasan ladang yang berbeza. Terdapat hubungan yang signifikan antara KAP dengan penggunaan PPE. Kajian ini menunjukkan terdapat perbezaan yang signifikan antara tiga pihak pengurusan dalam KAP terhadap penggunaan racun perosak. Walaupun pengetahuan dan amalan menunjukkan skor yang tinggi, sikap penyembur racun perosak dan pengurusan mereka sangat kurang .
Kesimpulan: Walaupun pengetahuan dan amalan menunjukkan skor yang tinggi, sikap penyembur racun perosak dan pengurusan mereka sangat miskin .

Perkataan: Pengetahuan, Sikap, Amalan, Racun perosak, Industri pertanian

ABSTRACT

KNOWLEDGE, ATTITUDE AND PRACTICE OF PESTICIDE USE AMONG MANAGEMENTS AND SPRAYERS AT THREE SELECTED AGRICULTURE INDUSTRIES.

NURUL AMIRAH BINTI JAMILUDDIN

Background: Studies on Knowledge, Attitudes, and Practices (KAP) indicate the unsafe use of pesticides is common in developing countries. This study was focusing on rubbers, pineapples and vegetables plantation. A survey showed that poisoning had occurred in 14.5% among 4,531 farmers in Cameron Highlands. A recent report by the Malaysian Department of Occupational Safety and Health revealed that the accident rate for improper handling of pesticides is four times higher compared to other type agricultural work. **Methodology:** A cross sectional study had been conducted to determine the knowledge, attitude and practice of pesticide use among managements and pesticide sprayers at three selected agriculture industries namely rubbers, pineapples and vegetables plantation. One hundred and fifty respondents were chosen by purposive sampling at three different plantations area, where each industry comprises of 10 managements workers and 40 pesticide handlers. Questionnaire consists of 5 main parts which are socio demographic, attitude, practice, PPE use and knowledge. Each part of attitude, practice and knowledge calculated based on the each Likert- type scale. Descriptive analysis was used to determine the percentage and mean for the knowledge, attitude and practice for each areas. Chi square test was used to determine the difference between KAP variable with use of PPE and Anova test was used to compare the KAP study among pesticide sprayer and managements. Reliability result shows high internal consistency (cronbach alpha coefficient = 0.966) **Result:** This study indicates that pineapple pesticide sprayer had the highest mean score (65.31%) followed by rubbers (62.79%) and vegetables (62.42%). However, there was no significant different ($p>0.05$) of good practice and attitude between sprayers and three different plantation areas. There is significant association of KAP with the use of PPE. The study indicates that, there is no significant difference between three management in term of their KAP of pesticide. Although the knowledge and practice shows high score, the attitude of the pesticide sprayers and their management is very poor. **Conclusion:** Although the knowledge and practice shows high score, the attitude of pesticide sprayer and their management is very poor.

Keyword: Knowledge, Attitude, Practice, Pesticide, Agricultures

TABLE OF CONTENT

TABLE OF CONTENTS **Page No**

CHAPTER 1: INTRODUCTION

CHAPTER 2 :LITERATURE REVIEW

CHAPTER 3 : METHODOLOGY

CHAPTER 4 : RESULT

CHAPTER 5 :DISCUSSION

LIST OF TABLE **Page No**

LIST OF FIGURE **Page No**

LIST OF ABBREVIATION

<	Less Than
<	More Than
%	Percent
N	Sample size
SD	Standard Deviation
et.al	and others
PPE	Personal Protective equipment
ILO	International Labour organization
FAO	Food and Agriculture Organization
KAP	Knowledge, Attitudes, and Practices
MCPA	The Malaysian Crop Life & Public Health Association
FELDA	Federal Land Development Authority
IDPIS	Integrated Drug and Poison Information Service
CAP	Consumer Association of Penang
MARDI	Malaysian Agricultural Research and Development
RISDA	Rubber Industry Smallholder Authority
MPIB	Malaysian Pineapple Industries Board

CHAPTER 1

INTRODUCTION

1.1 Background

Agriculture work is one of the most prevalent types and dangerous sector to work of employment in the world. There are about 50 percent of the world labor is employed in agriculture and they carry significant risk for development of pesticide risk (Das *et al.*, 2001). Agriculture is mostly deal with any age in terms of work-related fatalities, non-fatal accidents and occupational diseases. It is even more dangerous for children, immunocompromised and older people.

According to the ILO's latest estimates, there are approximately 215 million child laborers in the world, out of which 115 million are engaged in hazardous work. About 59 per cent (or 68 million) of children engaged in hazardous work are in agriculture, most of them in developing countries (ILO, 2011). In developing world, pesticide poisoning causes more deaths than infectious diseases. Pesticide poisoning among

farmers and occupational workers in developing countries is alarming (McCauley *et al.*, 2006).

Pesticides are chemicals used to eliminate or control a variety of agricultural pests that can damage crops and livestock and reduce farm productivity. The most commonly applied pesticides are insecticides (to kill insects), herbicides (to kill weeds), rodenticides (to kill rodents), and fungicides (to control fungi, mold, and mildew).

Table 1.1: Malaysian agricultural land use

Crop	Hectare		Annual growth		
			Eigth plan		Ninth plan
	2000	2010	Target	Achieved	
Oil palm	3377	4555	3.2	3.7	2.4
Rubber	1431	1179	-2.7	-2.7	-1.2
Fruit	304	375	5.1	1.7	2.6
vegetables	40	86	4.2	9.9	6..1

From the Table above it stated that, according to the 9th Malaysia Plan (2006-2010), chapter 22, the use of chemical and hazardous substances showed an increase, particularly in the agricultural sector. The volume of fertilizers used increased from 2.2 million tones in 2001 to 4.0 million tones in 2004. Through various governments initiatives such as Skim Akreditasi Ladang Malaysia (SALM) (**Good Agriculture Practice Scheme of Malaysia)** and Skim Organik Malaysia (SOM) (**Organic Certification Malaysia**), government has introduce safer handling measures, penalties for non-compliance with safety labels and promotion of safety features in production and sales by revising the Pesticides Act 1974 in September 2004, not all of the information is made available and well communicated to the consumers.

SALM is a national programmed to recognize and certify farms engaged in commercial fruit and vegetable production which adopt agricultural practices that are environment-friendly, sensitive to workers' welfare and yield quality products that are safe for consumption. This programmed was revised in 2005. Furthermore, SALM-certified farms are entitled to use the "Malaysia Best" logo, which provides an opportunity to brand products in the marketplace.

Other than that, studies regarding pesticides are considered important in order to mitigate pesticide risk and to help public health policies (WHO, 1991). Studies on

knowledge, attitudes, and practices (KAP) indicate that unsafe use of pesticides is common in developing countries, with a further need for research focusing on simple methods for surveillance, in order to develop and evaluate rapid local interventions (Wesseling *et al.*,1997).

Misuse of highly toxic pesticides, is the major reasons for high incidence of pesticide poisoning in developing countries (Konradsen *et al.,* 2003). All pesticides are potentially toxic and hazardous to human beings. The severity of pesticide hazard depends on its toxicity, route of exposure, whether oral, dermal or inhalation, and the extent of exposure. Short term exposure to high doses can cause irritation of the skin, eyes, nose and throat, difficulty in breathing, impaired functioning of the lungs, delayed response to a visual stimulus, impaired memory, stomach discomfort and possible changes in the liver and kidneys. Both short and long term exposure can also affect the nervous system (Sa'ed H.Z et a*l.*,2010)

Malaysia has a mechanism of monitoring the import of pesticides into the country. In the year 2004, statistic reveals that 51 065.51 metric ton was imported, and some 45 193.79 metric ton were brought into the country in 2003. The Malaysian Crop Life & Public Health Association (MCPA), which represents the pesticide industry in Malaysia in their Annual Report 2004, reported that the total Malaysian agrochemical

market in 2004 was RM 323 million ($85 million) and use of pesticides grew by 3.5 percent in 2004 over the previous year 2003 (MCPA, 2004).

Many government extension programs encourage the use of pesticides but do not consider their effects in the environment and health risk (Abate *et al.,* 2000). Prolonged exposure to multiple pesticide, will affected liver and kidney (Azmi *et al.,* 2006)

1.2 Problem Statement

A survey showed that poisoning had occurred in 14.5% of the 4,531 farmers growing vegetables, flowers and fruits in Cameron Highlands (Awang *et al.*, 2011). There are also reported from previous study, Johor is the highest poisoning cases in Malaysia (Zain, 1998). So, it shown that, there are previous cases of pesticide poisoning has been occurring in Malaysia. Not only that, in Malaysia, accident rate for improper handling of pesticides is four times higher from other agriculture work (Rengam *et al.,* 1991).

The impacts of pesticide exposure pesticide misuse in various sectors of the agriculture often have been associated with health problems and environmental contamination (Remor *et al.*, 2009)

A recent estimated record by the World Health Organization (WHO) puts the annual number of severe poisonings at 3 million, with about 220,000 deaths (WHO, 2011). It is a matter of further concern that based on a survey of self-reported minor poisoning in four Asian countries; it was shown that each year 25 million agricultural workers in the developing countries are exposed to the danger of acute pesticide poisoning (Jeyaratnam, 2004). Based on this statistic, there is a large problem needed to control as it involves the population health.

Other than that, some survey was carried out by the local agrochemical industry showed that, most of the estimated 715,000 rubbers and oil palm small holder farmers used paraquat (Shariff, 1993). Over a ten-year period pesticides accounted for 40.3% of the total number of 5,152 cases of human poisoning in Malaysia. Paraquat contributed 27.8%, other weed-killers 1.7%, malathion 4.7%, other organophosphates 2.1%, organochlorine compounds 2.6%, and other pesticides 1.4%. It has been estimated that about 73% of poisonings involving paraquat are suicidal, compared with 14% due to accidents and 1% due to occupational exposure (Jeyaratnam,2004). Based on all the problem arises, the study of knowledge, attitude and practice of pesticide use among management and sprayers at agriculture industries must be done

1.3 Study justification

High proportion of pesticide intoxications appear to be due to lack of knowledge, unsafe attitudes, and dangerous practices. The usefulness of KAP questionnaires in highlighting the lack of knowledge, attitude and practice with respect to safe use of pesticides and the need for future Interventions (Eddleston *et al.,* 2002).

This study were conducted to survey the pesticide application and pesticide management especially towards pesticide sprayers and managements staff from aspect of knowledge, attitude and practice that is often resulted inappropriate practice such as faulty sprayers, lack of protective equipment that adapted to tropical conditions and lack of information on safety and apparent lack of caution in the handling of pesticides.

Occupational exposure to pesticides is a great interest in order to identify the hazards of pesticide use and the establishment of safety methods of pesticide handling. This is because the impacts of pesticide exposure and pesticide misuse in various sectors of the agriculture often has been associated with health problems and environmental contamination worldwide. At the same time, it can increase the public awareness about pesticide poisoning and the preventive steps to avoid poisoning problem.

1.4 Conceptual framework

Based on Figure 1.2 it shows the overall overview about this study. The 'red arrows' was showing the parts involve in this study. There are five health hazards that might present at agricultural industries such as physical, chemical, biological, ergonomic and psychosocial. From the health hazard, it was focusing on chemical hazards which are pesticide, flammable and combustible gas, oxidizing chemical, and corrosive. From the chemical hazards, this study was focusing on pesticide use. There are many types of pesticide such as Paraquat, Glyphosate, Roundup, Orthrene and Meothin. Then, all those type of pesticide might cause accident of related pesticide trough route of inhalation, absorption and ingestion by human exposure.

Almost severe accident by ingestion either accidental or suicide cause pesticide poisoning and other health effect. Acute ingestion of organochlorine insecticides can cause a loss of sensation around the mouth, hypersensitivity to light, sound, touch, dizziness, tremors, nausea, vomiting, nervousness, and confusion. Acute organophosphate and carbamate exposure causes signs and symptoms of excess acetylcholine, such as increased salivation and perspiration, narrowing of the pupils, nausea, diarrhea, decrease in blood pressure, muscle weakness, and fatigue. These symptoms usually decline within days after exposure ends as acetylcholine levels return to normal. Pyrethroids can cause hyper-excitation, aggressiveness, uncoordination,

whole-body tremors, and seizures. Acute exposure in humans, usually resulting from skin exposure due to poor handling procedures, usually resolves within 24 hours. Pyrethroids can cause an allergic skin response, and some pyrethroids may cause cancer, reproductive or developmental effects, or endocrine system effects (Katarina Lah , 2011)

There are some accident related pesticide either reporting or non-reporting by farmers to managements. The example of reporting might from severe cases such as splashing of pesticide to the body, accidental ingestion of pesticide, and pesticide poisoning. However, some non-reporting cases were from long term effect of health which is appearing as normal symptom.

This study was focusing on Knowledge, Attitude and Practice (KAP) of pesticide use among managements and farmers at different agriculture industries. Through the knowledge, it can be studies the poor and good knowledge which are related with their practice of pesticide use among managements and pesticide sprayer. Other than that, attitude can be determined by looking at their positive and negative attitude towards pesticide use. Next, the practice which consist of Personal Protective Equipment(PPE) use, the storage and disposal of the pesticide container, and the way of application of pesticide to farm , which are can give comparison between knowledge and application safety prac

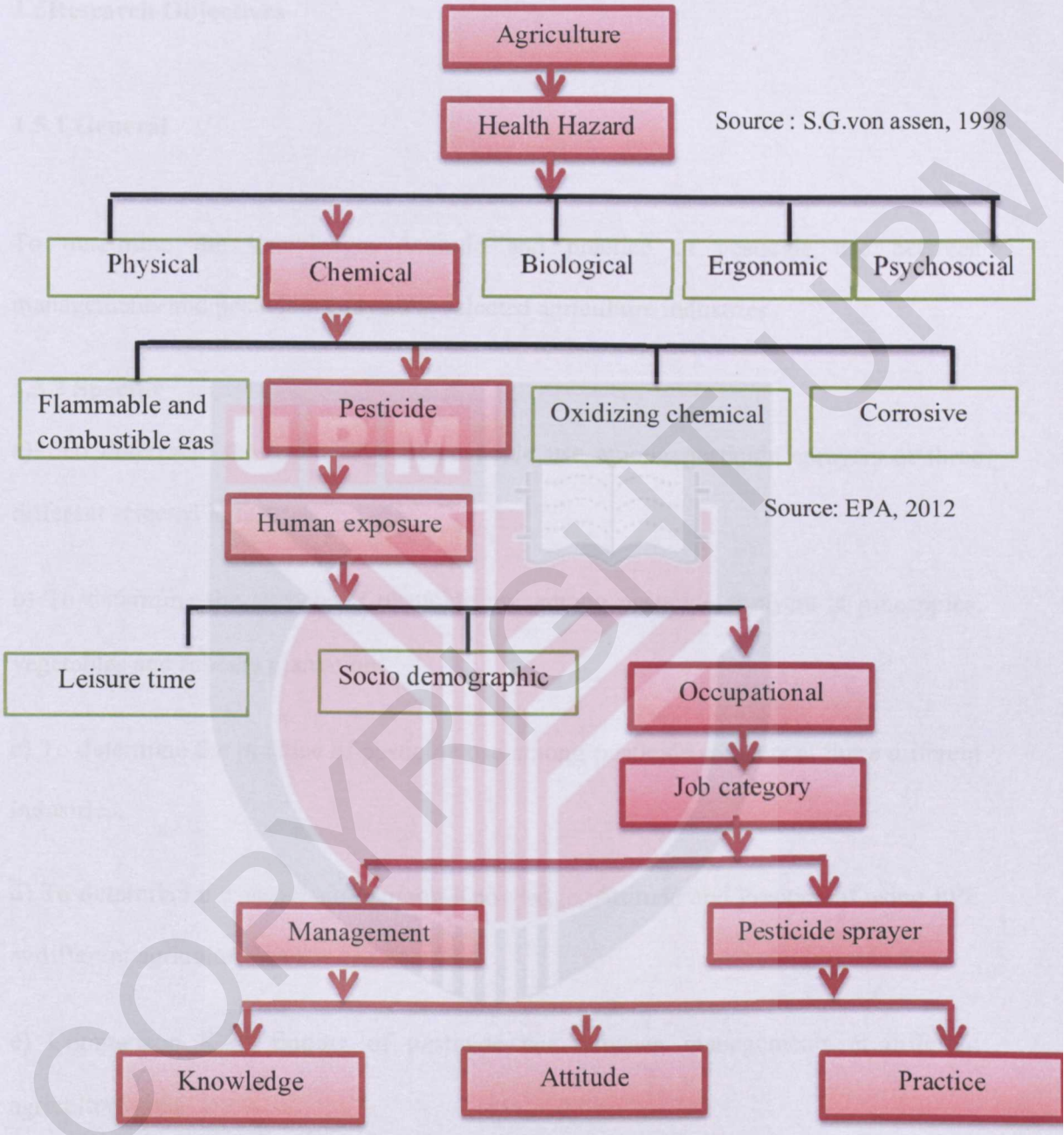

Figure 1.2: Conceptual Framework on Knowledge, Attitude and Practice of Pesticide Use between Management and Farmers at Selected Agricultural Industries.

1.5Research Objectives

1.5.1 General

To determine the knowledge, Attitude and practice of pesticide use between managements and pesticide sprayers at selected agriculture industries.

1.5.2 Specific

a) To determine the knowledge of pesticide use among pesticide sprayers at three different selected industries

b) To determine the attitude of pesticide use among pesticide sprayers at pineapples, vegetables and rubbers plantation.

c) To determine the practice of pesticide use among pesticide sprayers at three different industries.

d) To determine the association among Knowledge, Attitude and Practice of using PPE at different agriculture area.

e) Comparison KAP finding of pesticide use between managements at different agriculture area.

1.6 HYPOTHESIS

a) There is significant relationship among KAP study and PPE use at three areas.

b) There is no significance difference between management on KAP study among pineapple, rubbers and vegetables plantation.

1.7 VARIABLES

1.7.1 Independent variables

Socio demographic

The questioned consist of gender, age, education level, duration of work, type of work, current work location, and working history.

Knowledge

Knowledge from aspect of well practice by pesticide sprayer, type of personal protective equipment used, preventive action while handling pesticide, the way disposed of the used up pesticide containers and health effect of pesticide poisoning.

Attitude

Attitude is perceived susceptibility, severity and benefits of using personal protective equipment (PPE) for different agriculture industries.

1.7.2 Dependent variables

Practice

Practice about preventing farmers from adverse health effect of pesticide exposure and correctly use of personal protective equipment (PPE).

1.8 Definition of terms

1.8.1 Conceptual Definition

1.8.1.1 Knowledge

Knowledge is defined as facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject (Oxford dictionaries, 2013).

1.8.1.2 Attitude

Attitude is defined as manner, disposition, feeling, position with regard to a person or thing; tendency or orientation, especially of the mind a negative attitudes, group attitudes (Dictionary.com, 2013)

1.8.1.3 Practice

Practices is defined as perform (an activity) or exercise (a skill) repeatedly or regularly in order to improve or maintain one's proficiency (Dictionary.com, 2013).

1.8.2 Operational definition

1.8.2.1 Knowledge

Knowledge in this study is defined as knowledge related handling of pesticide in plantation. It is divided by three, which are high knowledge, moderate and low knowledge. Good knowledge indicates score from eighty percent and above. Moderate knowledge is classifying score between 60 – 79 percent and poor knowledge indicates score from 59 and below.

1.8.2.2 Attitude

Attitude in this study is focus on attitude of pesticide sprayers and management towards handling of pesticide and control measure against pesticide poisoning. The scored was divided by three categories which are good attitude, neutral attitude and poor attitude. Good attitude indicate eighty percent and above, neutral attitude between 60-79 percent and poor attitude indicate score below 59.

1.8.2.3 Practice

Practice in this study is defined as practice, which routinely done towards handling of pesticide. The scored was divided by three categories, which are good practice, fair practice and poor practice. Good practice indicates eighty percent and above, fair practice between 60-79 percent, poor attitude indicates score below sixty percent.

CHAPTER 2

LITERATURE REVIEW

2.1 Agriculture

Pesticide misuse in agriculture causes major health problems among smallholders in least developed countries (LDC) and for this reason has attracted the attention of international agencies and has been targeted by specific intervention programmes (Feola, G. and Binder,C.R.,2010). Malaysian agriculture has largely missed out in discussions about Malaysia's future. It does not even get much attention in the 10th Malaysia Plan (2011-2015). But in fact agriculture, along with fisheries and forestry, still accounts for 7-8 percent of Malaysia's gross domestic product, which is a high level for a country as Malaysia's stage of economic development. Furthermore, the sectors also involves around one million workers, with about half of these being temporary migrants which are part of the agricultural sector is highly dynamic, and have good potential for the future.

The scope of the agricultural sector is reflected in Table 2.1, which presents the areas of the main crops in 2012. The Table shows the huge predominance of oil palm in the total estimated crop area of 6.8 million hectares, followed by smaller extents of rubber and rice. It also denotes the relative roles in cultivation of the three main types of Malaysian agricultural entity, the estates, the land development schemes and the independent small holdings (Abdul R.E and Yean. T.S, 2011).

Table 2.1: Crop Areas on Estates, Land Development Schemes and Individual Smallholdings in Malaysia, 2012

Variable	Oil Palm	Rubber	Rice	Other	Total
Estates	2,707	61	-	10	2,778
Land Development Schemes	1,243	226	2	8	1,479
Independent Smallholdings	540	960	680	420	2,600
Grand Totals	4,490	1,247	682	438	6,857

(Source: Abdul R.E. and Yean T.S , 2011)

Based on the Table above, the estates which are also known as plantations consist of individual units that have large and commonly covering 2,000-10,000 hectares. The units are often grouped in big estate companies. The biggest of all, Sime Darby, controls 500,000 hectares of which 300,000 hectares are in Malaysia. The land development schemes are also extensive; with those managed by the Federal Land Development Authority (FELDA) being the most significant and being frequently managed like estates. In contrast, independent smallholdings are limited to 1-2 hectares, and are managed by family households which often only work part-time (Abdul R.E and Yean T.S , 2011)

2.2 Pesticide User in Agriculture and related legislation

Studies on the occupational exposure of sprayers have been limited in Malaysia. A study by Whitaker (2008) covering 400 Malaysian rubbers in Johor, Perak, Kelantan and Pahang reports a satisfactory awareness regarding the hazards from pesticides, safety and hygiene. The study however adds that standards in storage of pesticide containers and disposal of empty containers need to be improved, and emphasizes continued education and training program regarding the use of pesticides. From aspect land in agriculture sector, about 1.5 million hectares of land are devoted to the cultivation of rubber trees and 0.6 million hectares to oil palm trees in Peninsular Malaysia. The employment of almost 4.3 million people is related to agriculture (Awang *et al.,* 2011).

Pesticide belonging to WHO class 1a is extremely hazardous, class 1b is highly hazardous, class11 is moderately hazardous, class111 is slightly hazardous and class 1V is unlikely to present acute serious hazards in normal use (WHO, 2000). Nearly 90 percent of the banned pesticides fall into category 1a/ 1b/11 of the WHO hazard grades. Not only that, others study stated applications of monocrotophos, cypermethrin, methamidophos and dimethoate has been increased many folds in Pakistan (Tariq *et al.,* 2007).

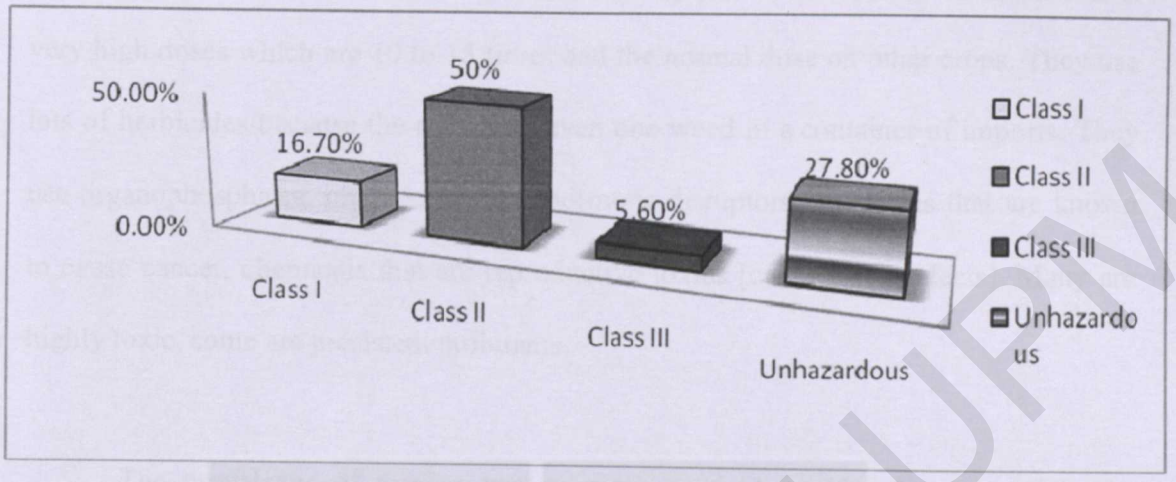

Figure 2.1: Four types classes of pesticide

In USA, more than 18,000 products are licensed for use and each year more than 2 billion pounds of pesticides are applied to crops, gardens, in homes etc. (U.S EPA, 2002). The major economic and environmental losses due to the application of pesticides in public health were 1.1 billion dollars per year in USA (Pimentel, 2005).

A study reports that in the year 1995, a total of 972 cases of pesticide poisonings were admitted to Malaysian hospitals. The same study reports that Johor and Perak had the highest number of deaths due to pesticide poisoning (33 cases) with Kedah reporting only one case; Perak reported the highest number of hospitalisations (137) and Kedah (29); Negeri Sembilan reported the highest number of suicide attempts using pesticides (125), Perak (71) and Kedah (4) (Zain, 1998).

The pineapples plantations have used paraquat, for example, to clear the soil at very high doses which are 10 to 15 times and the normal dose on other crops. They use lots of herbicides because the not allow even one weed in a container of imports. They use organophosphates, organochlorines, hormone disruptors, chemicals that are known to cause cancer, chemicals that are reproductive toxins [cause birth defects]. Many are highly toxic, some are persistent pollutants.

The prevalence of mixing two or more pesticides and using more than the recommended concentration of pesticide was high among interviewed farm worker and this practice could put the farm workers at risk, due to synergistic or potentiating effect of chemicals (Allaby M,1994)

Integrated Drug and Poison Information Service (IDPIS) of the Malaysian National Poison Centre. The primary aim of the IDPIS is to disseminate information concerning health-related matters, especially with regard to drug usage and poison control, to health professionals and the public alike (Razak *et al.*, 1991)

There are several laws that regulate the environmental management of chemical substances in different area such as the Environmental Quality Act 1974. The Environmental Quality Act, 1974 is related to the control of chemical substances in air and hazardous wastes whilst the Food Act, 1983 controlling chemical substances in the products and goods in the food industry. One of the function Occupational Safety and

Health Act, 1994 is to manage chemical substances in the occupational environment and the Pesticides Act, 1974 is to control chemical substances in pesticides.

Meanwhile the management of these laws is not the responsible of a single government ministry. Different government ministries may enforce the laws relevant to the operation of that ministry. Hence, the Environmental Quality Act, 1974 is the responsible of the Ministry of Natural Resources and Environment, the Occupational Safety and Health Act, 1994 is by the Ministry of Human Resources whilst the Food Act, 1983 is by the Ministry of Health and as for the Pesticides Act, 1974 under the supervision and administration of the Ministry of Agriculture and Agro-based Industry. Finally, this study has been concluded that Malaysian has a sufficient laws in which may adequately control chemical substances in various life cycles as to comply with international law particularly in urban area in order to achieve urban sustainability.

2.3 Health Effect of Pesticide

Pesticides affect human health in three major ways which is immediate or acute effects: reactions to pesticides that occur due to direct contact with pesticides and manifest within a very short time. The most common effects are irritation of the eyes, nose and throat such as tearing, stinging, burning and coughs, skin irritation and rashes.

The second way health effect is by chronic effects through the reactions that occur due to low levels of exposure over a long period of time, which may take months or years to manifest as cancers, neurological damage or reproductive system disorders. The third way was an effect on existing conditions through the aggravation of existing medical condition conditions such as asthma and allergies, heart and immune system disorders.

There are previous studies (Panap, 1999) concerns over the use of chemicals that can disrupt the endocrine system, which controls key developmental, reproductive, behavioral and immunological functions. Because of the disrupting, it can give arises to the changes of fatal development in the womb which are irreversible. For example, the changes in the developing brain can alter neural pathways leading to alterations in behavior and endocrine function, changes to the thymus and bone marrow cells can lead to immune suppression and changes to the developing testes or ovaries can affect sperm or egg quality and quantity Chemical pesticides known to disrupt the endocrine system among others include DDT and its degradation products such as DDD and DDE, Alachlor, Aldicarb, Aldrin, Atrazine, Carbaryl, Carbofuran, Dimethoate, Dinoseb, Endosulfan (thiodan), Endrin, Fenitrothion, Fipronil, Lindane, Malathion, Maneb, Methoxychlor, Parathion, 2,4,5- T, 2,4-D, Toxaphene, di(2-ethylhexyl) phthalate), dicofol, hexachlorobenzene, synthetic pyrethroids, Chlorpyrifos and Deltamethrin. (Panap, 1999).

In developing world, pesticide poisoning causes more deaths than infectious diseases. Pesticide poisoning among farmers and occupational workers in developing countries is alarming (McCauley *et al.,* 2006). Prolonged exposure to multiple pesticide, will affected liver and kidney (Azmi *et al.,* 2006).

From the statistics, pesticide poisoning cases in Malaysia for the year 2000 showed that paraquat was the top highest agent that involved in pesticides poisoning followed by organophosphate as the second highest agent involve in poisoning (Sirajuddin *et al*., 2001).

Cancer and even death is more frequent among farmers rather than general population (Gertrudis *et al*., 2001). Between June 1997 and November 1998, there were 36 cases of respiratory disease and 95 cases of poisoning by chemicals and pesticide notified while skin disease were 108 cases. Respiratory disease reported were predominantly occupational asthma (25%), pneumoconiosis (17%) and infection (39%). The commonest reported was contact dermatitis (87%), commonest causes of occupational poisoning was paraquat (19%), organophosphate (16%), agrochemical excluding pesticide (15%) and gases (10%) (DOSH,2010).

Next, Invivo and invitro studies showed that organophosphorous, organochlorine and pyrethroids pesticides caused increase of LDH activity (Bagchi *et al.,* 1995 and

Yousof *et al.,* 2006). LDH is used as an indicator for cellular damage and cytotoxicity in pesticides exposure (Bagchi *et al.*, 1995).

Recent studies have examined a link between pesticides exposure and neurological outcome (Kamel and Hoppin, 2004). Organophosphates being inhibitors of esterases lead to the accumulation of acetylcholine at nerve endings leading to cholinergic crises, by initial stimulation and eventually exhaustion of cholinergic synapses (Singh and Sharma, 2000).

2.4 Knowledge, Attitude and Practice (KAP) Of Pesticide

A KAP study measures the knowledge, attitude and practice of a community. It serves an educational tool for community. The main purpose of this KAP study is to explore changes in Knowledge, Attitude ad practice of community (Kaliyaperumal, 2004). A KAP survey is representative study of specific population to collect information on what is known, believed and done in relation to a particular topic (WHO, 2008).

A 1998 survey of pesticide use and associated incidences of poisoning in Peninsular Malaysia is reported that majority farmers having pesticide poisoning from estate workers. The study also revealed that organophopshorous insecticides and rodenticides were used widely in oil palm plantations; however the estate workers did not understand or were unaware of the color coding of chemicals, and the potential hazards from pesticides (Ramasamy *et al.*, 1988). Low education levels of the rural population, lack of information and training on pesticide safety, poor spraying technology, and inadequate personal protection during pesticide use have been reported to play a major role in the intoxication scenario (Hurting *et al.*, 2003).

The activities mostly identified by the pesticide users which resulted in poisoning and problem included spraying using knapsack spray equipment, mixing and diluting of pesticides, and repairing or cleaning of spray equipment. In all four countries spraying, mixing and diluting of pesticides were the most frequently identified activities associated with poisoning. Some of the specific factors contributing to acute pesticide poisoning are lack of protective clothing suitable for tropical climates. Poor knowledge and understanding of safe practices in pesticide use of pesticides by farmers in excess of requirements, poor maintenance facilities for spray equipment, giving rise to hazardous contamination. Poisoning cases most commonly occur during spraying, mixing, and diluting the pesticides. A study conducted in Malaysia revealed the following

information on the activities associated with high incidence of pesticide poisoning (Jeyaretnam, 2004).

A study by the Consumer Association of Penang (CAP) revealed that as many as 90 per cent of the farmers surveyed did not observe safety measures while handling pesticides. Used pesticide containers were disposed of in water areas, and none of the farms displayed the notice "Danger: Pesticide Sprayed Area, No Entry to Unauthorized Persons", as stipulated by regulations (CAP, 1996).

Based on the existing literature, there are a number of factors that have shown to influence the domain of attitude. One of it is knowledge. According to D'Silva *et al.,(*2010) knowledge plays an essential role in assisting farmers to embrace sustainable agricultural practices as sound knowledge will help farmers to attain a higher level of competitiveness, enhanced productivity and improvement in the quality of life.

Pesticide information service was developed and a pilot information system was launched throughout the country in 1989. It is part of the Integrated Drug and Poison Information Service (IDPIS) of the Malaysian National Poison Centre. The primary aim of the IDPIS is to disseminate information concerning health-related matters, especially with regard to drug usage and poison control, to health professionals and the public alike (Razak *et al.*, 1991).

Pesticide container majority form plastic form. Plastic containers are highly stable and do not biodegrade, therefore if buried; the container will remain intact indefinitely. Burying containers is not easy because the characteristics such as void space inside the container and its low density. This will lead to the container to rise gradually to the surface of the soil. As such, burying at the place of use is not a viable solution (WHO, 2008).

Farm workers in developing countries will continue to use pesticide in increasing quantities because of lack of alternative to pesticide, ignorance of pesticide use and weak enforcement of regulation and laws of pesticide use (Wesseling C. *et al.*,1997 and Wilson.C,2001).The higher levels of knowledge of pesticide use, but the use of protective measures was poor. Farmers workers with good pesticide knowledge were more inclined to use pesticides according to the recommended guidelines for protective measures (Salameh *et al.,* 2004).

2.5 Personal protective equipment use when handling pesticide

The use of complete PPE will decrease the health effect of pesticide and poisoning cases (Woodruff *et al.*,1994). Personal protective equipment (PPE) is given a rating scale by the EPA according to a resistance factor against pesticides consist of

high, moderate, and low. A high PPE rating means that the material is highly resistant to pesticides in that category. PPE made of this type of material can be expected to protect for an 8-hour work period. The remaining pieces of the PPE, especially gloves, should be washed at rest breaks or every four hours. Highly resistant PPE is a good choice when handling pesticides, especially emulsifiable concentrates, for long periods of time.

A moderate rating means that the material is moderately resistant to pesticides in that category. PPE made of this type of material can be expected to protect for one to two hours. Replace this type of PPE after the allotted time with new items or thoroughly wash the outside with soap and water. PPE with a moderate rating may be a good choice for pesticide handling tasks that last only a couple of hours.

A low resistance rating means the material is only slightly resistant to pesticides in that category. PPE constructed with this type of material can be expected to protect for only a few minutes after exposure to the pesticide product. Replace this type of PPE after the allotted time with new items or thoroughly wash the outside with soap and water. Slightly resistant PPE may be a good choice for pesticide handling tasks that last only a few minutes (Brian.B.*et al.,* 2005).

The factors moving a farmer towards the use of PPE can be different from those influencing him or her in using the equipment regularly. For example, the share of pesticide application work or the experience of adverse health effects significantly influenced the probability of deciding to use both gloves and facial protection, but not the probability of using these items regularly. Education and information programs are usually proposed to trigger more sustainable PPE use among smallholder farmers and pesticide applicators. However, such programs may not be the most appropriate in the case of farmers who already show a relatively high level of awareness of the risks involved and their potential adverse health effects (Cialdini RB and Goldstein NJ. 2004).

CHAPTER 3

METHODOLOGY

3.1 Study Location

This research has been conducted at three separate industrial areas. Study location was comprised of agriculture industries consist of rubbers, pineapples and vegetables. The rubber plantation is located at Segamat, Johore which are under management of RISDA (Rubber Industry Smallholder Authority). Next, survey was conducted at the vegetables plantation which is located at Cameron Highland, Pahang which are conducted by Malaysian Agricultural Research and Development (MARDI). Beside Pineapple plantation was located at Pekan Nanas, Pontian Johore with which are supervised by Malaysian Pineapple Industries Board (MPIB).

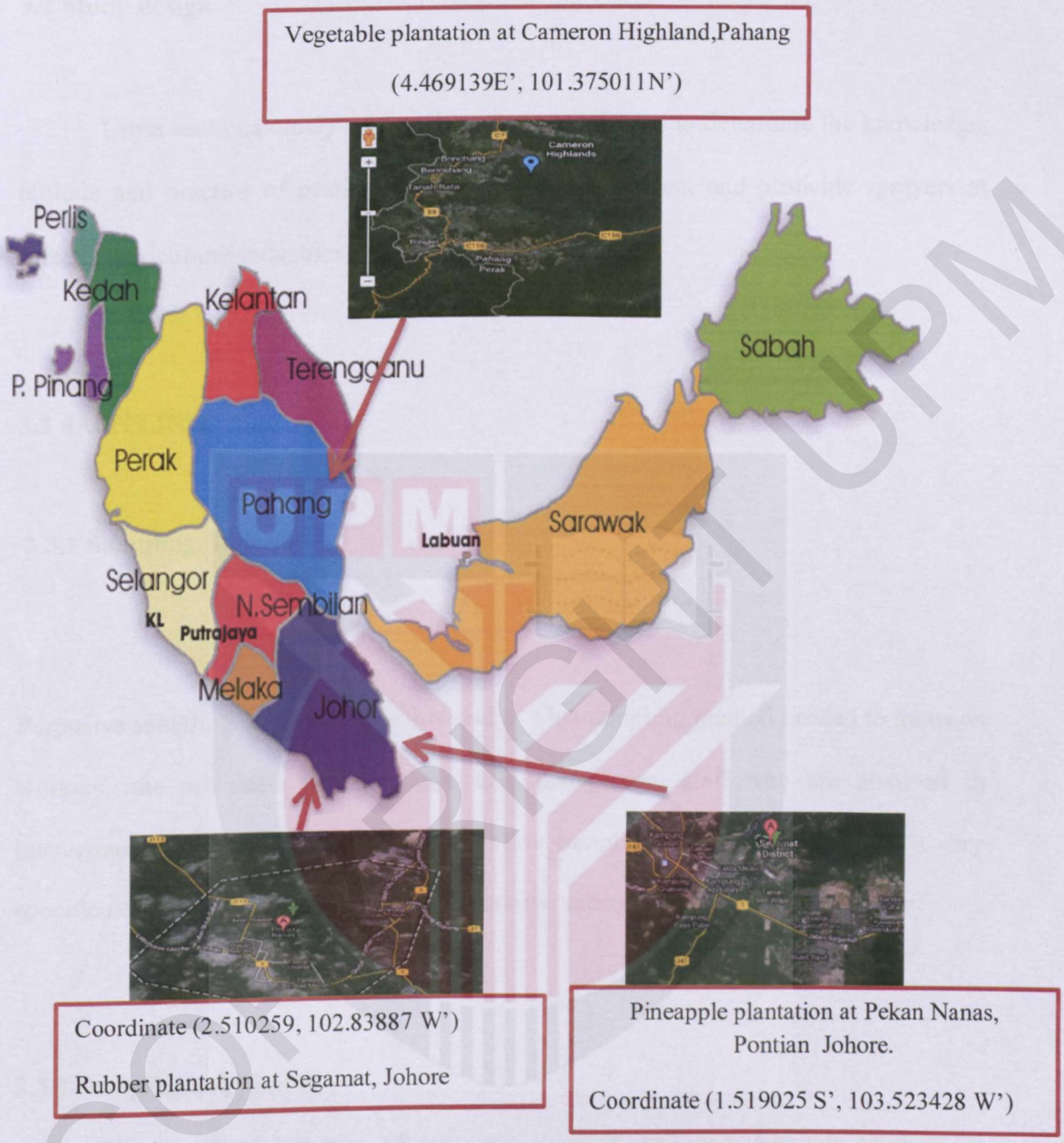

Figure 3.1: Study location at Segamat,Johore, Pontian,Johore and Cameron Highland,Pahang.

3.2 Study design

Cross sectional study designs have been conducted to determine the knowledge, attitude and practice of pesticide use between management and pesticide sprayers at selected agriculture industries.

3.3 SAMPLING

3.3.1 Sampling Method

Purposive sampling was applied in this study. This sampling method needed to focus on workers who are deals with pesticide and management staff who are involved in management of plantation only. The purposive sampling is chosen as to serve a very specific need or purpose and a non-representative subset of some larger population.

3.3.2 Sampling population

The population consist of pesticide sprayers and managements workers at rubbers, pineapple and vegetables plantations.

3.3.3 Sampling frame

The sampling frame of this study is the name list of pesticide sprayers and managements workers obtained from each officer of rubbers, pineapples and vegetables. The officer that deals for rubbers is RISDA, the officer for vegetables is MARDI and the officer for pineapples is MPIB.

3.3.4 Inclusion criteria

The inclusion criteria are workers who are deals with pesticide. There is also man and women who are more than 18 years old and women who are not pregnant are included. Pregnant women is not included because the physiological differences in women's bodies (more fatty tissue, thinner skin and lower kidney functions) make them more vulnerable to pesticide exposure than men. During pregnancy, pesticides can cross the placenta and affect the developing foetus (Panap, 1999).

3.3.5 Study Sample

The study sample consists of 150 of total pesticide sprayers and managements at three different agricultural industries. There were about 50 respondents for the each industry. Then, from each industry 10 people were chosen from the management's worker and 40 people of pesticide sprayers.

3.3.6 Sampling size

The sample size were determined in order to have 95% confidence limits (1.96) and 5% maximum error of the estimate, when the prevalence of pesticide toxicity is 90% from studies of Yassin *et al.,(*2002). The number of respondents was increased by >10% for the strength of analysis of the study and to take into account non responsive respondents, missing data and errors.

The sample size was calculated by using formula Daniel (1999), which is:

$$n = \frac{Z^2 \mathrm{P} - (1 - \mathrm{P})}{d^2}$$

Where,

n= sample size

Z= Z statistic for a level of confidence

P = Expected prevalence or proportion (in proportion of one, if 90%, P=0.9)

d= precision (in proportion of one; if 5%, d =0.05

The sample size is calculated based on study done by Yassin *et al.,(*2002):

$$n = \frac{Z^2 P-(1-P)}{d^2}$$

$$n = \frac{1.96^2\ (0.9)\ (1\text{-}0.9)}{0.05^2}$$

$$n = \frac{3.46\ (0.1)}{0.05^2}$$

$$n = 138$$

The total respondent were 138 the sample of study As mention before, the calculated sample size was increased by 10% , therefore the total was 150.

3.4 Study of Instrument and data collection

3.4.1 Approval Letter

Consent letter were distributed among listed respondents to get their consent to participate in this study.

3.4.2 Questionnaire

The questionnaire is one of the tools to get information from the respondent. The respondent have been given questionnaire in Malay language to make them understand and easy to complete the questions. The questionnaires were based on previous study conducted by Saowenee, (2010).

The questionnaire consists of five sections as following:

i. Section A : Socio demographic information
ii. Section B : Attitude towards use of pesticide
iii. Section C : Practice towards prevention and control of pesticide handling
iv. Section D : Type of PPE use while handling of pesticide
v. Section E : Knowledge related pesticide

i) Section A: socio demographic information

For the 1st part that is socio demographic contain 14 questions regarding general information about gender, age, education level, duration of work, type of work, current work location, and working history.

ii) Section B : Attitude towards use of pesticide

There were 13 questions in this part. This part includes the attitude of farmers and managements toward using pesticide. Question on attitude are designated to be answered using a Likert scale (Strongly agree / Agree / Neutral/ disagree/ strongly disagree). For positive attitude items score of "5" , " 4" , "3" , "2", "1". For negative attitude, the above scoring system is reverse. .There was 10 statements which include both positive and negative. The rating scale was measure as follow:

Table 3.1: List of Attitude questions with negative and positive statement

	Attitude item	Statement	Optional answer with Likert-type scale score
1.	Insert the pesticide in the mouth with consciousness can categories as suicide	Positive statement	Strongly agree =5 Agree = 4 Neutral = 3 Disagree= 2 Strongly disagree=1
2.	Drink mineral water is important after exposed to pesticide		
3.	Expensive chemicals are effective to control pest better than cheap pesticide.		
4.	Standing against windy direction while spraying pesticide can get poisoned		
5.	Pesticide can give residues in agriculture product and its harm to consumers.		
6.	Using wood-based to mix the pesticides is safety than using hand		
7.	Exercise can help to excreting pesticide toxicity through sweat		
8.	Pesticide harm to human and environment		
9.	Mix with different type of pesticide in one time will increase effectiveness and no downside	Negative statement	Strongly agree= 1 Agree = 2 Neutral = 3 Disagree= 4 Strongly disagree=5
10.	Drinking coconut juice after exposed pesticide can destroy toxic substances in the body		
11.	If spraying without wearing full complete PPE can will cause poisoning		
12.	If spraying chemical without wearing protective equipment, must shower immediately after the spray as preventive measure		
13.	Use pesticide more than label recommendation may increase yield		

iii) Section C: practice towards prevention and control of pesticide handling

Practice of using PPE to prevent them from pesticide poisoning. There were 20 questions in general practice of the farmer and admin on using personal protective equipment. Practice questioned also designated to be answered using Likert scale (usually/ sometime/ rarely/never) for scores "4", "3", "2", "1

Table 3.2: List of Practice questions with negative and positive statements

Practice item	Statement	Optional answer with Likert type scale score
1 Training on handling pesticide before started spraying	Positive statement	Usually = 4 Sometime = 3 Rarely =2 Never = 1
2 Wear glove and mask during mixing of pesticide		
3 Read label and follow instruction before started spray		
4 Check equipment and material of spraying before use it		
5 Avoided human and animal from spraying area		
6 Select pesticide as it have been recommended		
7 Wearing safety boot during spraying		
8 Cleaning pesticide applicator with detergent before storage		
9 Cloths that wear must immediately change after finished sprayed.		

	Practice item	Statement	Optional answer with Likert type scale score
10	Wash cloth immediately after used it for spraying	Positive statement	Usually = 4 Sometime = 3 Rarely =2 Never = 1
11	Store pesticide in storage room		
12	Empty pesticide containers should be burned or buried		
13	Wash hand and was face before having meal after sprayer		
14	Inhale pesticide for confirming the type of pesticide	Negative statement	Usually = 1 Sometime = 2 Rarely =3 Never = 4
15	Mix pesticide by hand		
16	Smoking while performing spraying		
17	Spray pesticide while windy		
18	Stand windward direction while spraying without protective equipment		
19	Cleaning pesticide containers by using water from river after finish sprayed.		
20	Disposed pesticide containers in river after used		

iv) Section D: Type of PPE on handling of pesticide

There were 4 subsections in this part of questionnaire. It consists of PPE used while transportation of pesticide, while mixing of pesticide, during spraying of pesticide and PPE used while washing pesticide container and equipment use. The PPE involve is apron, mask, goggle, long sleeve shirt, long pants, glove, cap and boot.

iv) Section E: Knowledge regarding handling of pesticide

There were 16 questions in this part. The question asked for the knowledge of using pesticide and personal protective equipment (PPE) including adverse health effect of pesticide and type of proper PPE. A correct answer was given 1 score and 0 score for wrong answer and selecting "did not know" answer do not affect the grade. The score were varied from 0-16 point and classified into 3 levels as follow:

In Table 3.3, 16 questions regarding knowledge with optional answer that was given to the respondent. This part does not have positive or negative statement.

Table 3.3: List of Knowledge questions without negative and positive statement

Knowledge item	Optional answer
1. Pesticide can effect human health	1.Yes 2.No 3.Did not know
2. Pesticide can kill livestock animal	
3. Pesticide can kill plant	
4. Duration of symptom within 24 hour	
5. Have to take into consideration the suitable time to use pesticide	
6. Route of entry through inhalation	
7. Route of entry through skin penetration	
8. Route of entry through ingestion	
9. Herbicide must be isolate from others pesticide storage	
10. To buried empty pesticide container , sprayers need to digging a deep hole about 0.5-1 meter and 30 meters from water sources	
11. If there are spill of pesticide immediately use absorbent material such as sawdust and sand	
12. Has a prohibition period of harvest after spraying pesticide	
13. Need to know wind direction and condition surrounding before started spraying	
14. After spraying, need to isolate the shirt that worn with others cloth	
15. There are two type of pesticide effect either acute or chronic	
16. Used of PPE can reduce poisoning	

3.5 Data analysis

Statistical method for analyzing data in this study was done by using Statistical Packages for Social Science (SPSS) version 22.0.Analysis was done by using this software at different levels. The level of significance study was set up at $p<0.05$.

Table 3.4: List of statistical analysis according to objectives

No	Objectives	Statistical analysis
1	To determine the knowledge of pesticide use among pesticide sprayers at three different selected industries	Descriptive analysis
2	To determine the attitude of pesticide use among pesticide sprayers at pineapples, vegetables and rubbers plantation.	Descriptive analysis
3	To determine the practice of pesticide use among pesticide sprayers at three different industries.	Descriptive analysis
4	To determine the association among Knowledge, Attitude and Practice of using PPE at different agriculture area.	Chi square test analysis
5	To Compare the Difference KAP Study Among management at Different Agriculture Area	One-way ANOVA test analysis

Tables 3.5 indicate the score for each category of attitude, practice, knowledge and total score. For each part of the questionnaire with the option answer with different score. For part of practice and attitude, consist of positive and negative statement.

However, items on knowledge only have optional answer either "Yes", "No" and "Did not know". Then, each part with score was calculated manually to determine the grand score for each respondent. For all the attitudes questions, the total scores vary from 0 until 65. Answer were summed up for total score percentage. On part of 21 practice questions, the answer scored varied from 0 until 84. While the knowledge score is based on yes and no answer.

Table 3.5: Score for each category of attitude, practice, knowledge and total score

Variable	Score
***Attitude**	
Concern	52-65scores (80-100%)
Neutral attitude	39-51 scores (60-79%)
Not concern attitude	00-38 scores (less than 60%)
***Practice**	
Good practice	64-80 scores (80-100%)
Fair practice	48-63 scores (60-79%)
Poor practice	0-47scores (less than 60%)
***knowledge**	
Low level knowledge	0-9 (less than 60%)
Moderate level knowledge	10-12 (61-80%)
High level knowledge	13-16 (81-100%)

*13 question of Attitude = Consist of 5 likert score (Strongly agree, Agree, Neutral, Disagree, Strongly disagree)
(Total highest score= 13x 5=65)

*20 question of Practice= Consist of 4 likert score (Usually, Sometime,Rarely,Never)
(Total highest score= 20x4=80)

*16 question of Knowledge = Correct answer= 1 score
Wrong answer= 0 score

Did not know answer= not affect grade

3.6 Quality control

3.6.1 Questionnaire

Validity and reliability of the instruments

The item in the questionnaire was designed based on validated question from Saowanee (2010). Pre-test were conducted among farmers for more than 10% of sample size to ensure understanding of the question. Reliability were tested for internal consistency using Cronbach's alpha coefficient Reliability result shows high internal consistency (cronbach alpha coefficient = 0.966).

Table 3.1: Reliability Test

Component Tested	Value Each Tested	Value Alpha Cronbach
16 item of Knowledge	0.924	
13 item of Attitude	0.894	0.966
20 item of Practice	0.956	

3.7 Research Ethics

This study had been approved by ethics committee members of University Putra Malaysia (UPM/TNCPI/RMC/IACUC/1.4.18.1/F1). This study had been conducted on a voluntary basis where all respondents had been briefed on how the study will be conducted. Only those who had given their written permission took part in this study.

CHAPTER 4

RESULT

This chapter provides a detailed description of result obtained from the analysis of the survey. The survey is described as simple percentage and mean as appropriate. It begins with socio demographic data, followed by the response for each part of questionnaire. The level of knowledge, attitude and practice were then calculated manually their score and value of score insert in SPSS. Result of statistic test used as appropriated. Lastly, each objective has stated result differently and recorded each value

4.1 Socio demographic of total respondent

The sample sizes were 150 of total respondent at three different areas. The response rate was 76%. There were 96 pesticide sprayer and 18 management's staff. The socio demographic and characteristics were presented in Table 4.1. Majority of pesticide sprayers (88.5%) of participant were male and Malay ethnicity (59.5%), followed by the Nepalese (35.4%), Chinese (3.1%) and lastly Indian (2.1%). In term of education level, majority of them attended secondary school (55.2%) and a small number had attended college education (17.7%).The distribution of pesticide sprayers by nationality were divided by two which are Malaysian and foreign workers. The majority of the pesticide sprayer in this study was from Malaysian workers (67.7%) and the rest were foreign workers (32.3%). The distributions by job category are divided by two which are mix activities and sprayers. Mix activities are workers who are do pesticide sprayer and do others job task with rotation. Majority respondent are perform specific job task as pesticide sprayer (55.2%) and the rest perform mix activities (45%).

Table 4.1: The socio demographic of respondents

Variable	Characteristic	Study group (N=96)	
		N	(%)
Gender	Male	85	88.5
	Female	11	11.5
Race	Malay	57	59.5
	Chinese	3	3.1
	Indian	2	2.1
	Nepalese	34	35.4
Education	No formal education	6	6.3
	Primary	17	20.8
	Secondary	24	55.2
	College	20	17.7
Nationality	Malaysian	65	67.7
	Foreigner	31	32.3
Job category	Mix activities	43	45
	Sprayer	53	55.2

n=96

4.2 Knowledge about pesticide

As shown in Table 4.1, the total of the knowledge scored were higher in pineapples pesticide sprayers compared to vegetables and rubber's pesticide sprayers. Pineapple pesticide sprayers resulted 96% of total level of knowledge which can be categorized as have a good knowledge and result also showed that knowledge score was found to be significantly higher ($p<0.05$) among pesticide sprayers working in pineapple plantation compared to those in rubber and vegetable plantation. Pineapple pesticide sprayer has the highest knowledge on only one question regarding managing pesticide container. In addition those working in the pineapple industry show better understanding of route of exposure to pesticide compared to others. The total score of rubbers was 72% whereas vegetables pesticide sprayers are 74%. So, rubbers and vegetables pesticide sprayers both in categories of moderate knowledge related pesticide handling.

When determining each score for each questioned item , it was calculated that the vegetable pesticide sprayers had highest percentage in 16 of the questions asked to them, out of 16 questions, 4 questions indicate the lowest knowledge compared to pineapple and rubber's pesticide sprayers. Questions includes on the knowledge of medical symptoms and route of exposure due to pesticide exposure and type of health effect. The study indicate that those working as pesticide sprayer in rubber plantation

had higher knowledge in term of effect of pesticide to human and animal and some method of managing pesticide.

Table 4.2: The knowledge of pesticide use among pesticide sprayers at three plantation areas

Knowledge	Chosen Answer	Pineapple N(%)	Rubber N(%)	Vegetable N(%)
			N=96	
1.Pesticide can effect human health	Yes	26(27.1)	34(35.4)	36(37.5)
2.Pesticide can kill livestock animal	Yes	24(27.3)	33(37.5)	31(35.2)
3. Pesticide can kill plant	Yes	25(28.4)	33(37.5)	30(34.1)
4.Symptom will be appear within 24 hour	No	1(7.1)	5(35.7)	7(50)
5. Have to take into consideration the suitable time to use pesticide	Yes	25(27.2)	29(31.5)	38(41.3)
6.Route of entry through inhalation	Do Not Know	1(1.71)	5(35.7)	8(57.1)
7.Route of entry through skin penetration	Yes	25(27.2)	30(33)	36(39.6)
8.Route of entry through ingestion	Do Not Know	1(5)	5(25)	14(70)

Knowledge	Chosen Answer	Pineapple N(%)	Rubber N(%)	Vegetable N(%)
			N=96	
9. Herbicide must be isolate from others pesticide storage	Yes	2(16.7)	6(50)	4(33.3)
10. To buried empty pesticide container , sprayers need to digging a deep hole about 0.5-1 meter and 30 meters from water sources	Yes	19(44.2)	9(20.9)	15(34.9)
11. If spilling of pesticide occurs immediately use absorbent material such as sawdust and sand.	Yes	19(35.8)	10(18.9)	24(45.3)
12. Has a prohibition period of harvest after spraying pesticide	Yes	1(4.3)	12(52.2)	10(43.5)
13.Need to know wind direction and condition surrounding before started spraying	Yes	26(29.2)	26(29.2)	27(41.6)
14. After spraying, need to isolate the shirt that worn with others cloth	Yes	25(26.3)	31(32.6)	39(41.1)
15. There are two type of pesticide effect either acute or chronic	Do Not Know	3(10.7)	12(42.9)	13(46.4)
16.Used of PPE can reduce poisoning	Yes	25(27.2)	29(31.5)	38(41.3)
MEAN± SD		**14.5±1.7**	**10.1±4.72**	**10.5±5.0**
TOTAL SCORE		**(96%)**	**(72%)**	**(74%)**
		High	**Moderate**	**Moderate**

4.3 Attitude on the use of pesticide among sprayers

Based on the result, it shows rubber pesticide sprayer believed in using expensive pesticide is better than using cheap pesticide, but this opinion disagree by vegetable and pineapple pesticide sprayer. In term of wind direction, pineapple pesticide sprayers (37.8%) "very much agreed" that the position of the sprayers against wind direction can increase the risk of pesticide poisonings, however this opinion is deny by rubbers (35.8%) and vegetable (26.7%) pesticide sprayers. Most of the rubbers pesticide sprayer believed that by drinking coconut water can be the medication for pesticide poisonings.

In term of personal protective equipment, 50% of vegetable pesticide sprayer highly believed that incomplete use of personal protective equipment has the highest risk of pesticide poisoning. In term of the attitude shown by the pesticide sprayers, the study indicated that there is a balance of attitude among pesticide sprayers from the 3 different plantations. All of them had a mix of positive and negative statement as shown in Table 3.1.Therefore the study showed that there is no significant different of attitude score ($p>0.05$) between the 3 group. All groups indicate poor attitude toward the use of pesticide. The pineapple (47%), vegetables (49%) and rubbers (48%) pesticide sprayers all can be categorized as poor attitude.

Table 4.3: Attitude on the use of pesticide among sprayers

Items	Chosen answer	Pineapples N(%)	Rubbers N(%)	Vegetables N(%)
			N=96	
1.Inserting pesticide in the mouth with consciousness can be categories as suicidal	Very Agree	17(32.1)	17(32.1)	19(35.8)
2.Mix with different type of pesticide in one time will increase effectiveness and no downside	Disagreed	5(21.7)	13(56.5)	5(21.7)
3.Standing against windy direction while spraying pesticide can get poisoned	Very Agree	17(37.8)	16(35.8)	12(26.7)
4.Drinking coconut juice after exposed pesticide can destroy toxic substances in the body	Agree	6(35.3)	7(41.2)	4(23.5)
5.Drink mineral water is important after exposed to pesticide	Very Disagree	26(28.9)	32(35.6)	32(35.6)
6.Expensive chemicals are effective to control pest better than cheap pesticide.	Very Agree	13(37.1)	16(45.9)	6(17.1)

Items	Chosen answer	Pineapples N(%)	Rubbers N(%) N=96	Vegetables N(%)
7. If spraying without wearing full complete PPE can will cause poisoning	Do Not Know	2(16.7)	4(33.3)	6(50)
8.If spraying chemical without wearing protective equipment, must shower immediately after the spray as preventive measure	Very Agree	15(31.9)	14(29.8)	18(38.3)
9.Exercise can help to excreting pesticide toxicity through sweat	Agree	5(25)	8(40)	7(35)
10.Increase amount of pesticide anytime of use to prevent resistance	Very Disagree	26(28.7)	32(35.6)	32(35.6)
11.Pesticide can reside in agriculture product and its' harm to consumers.	Very Agree	14(37.8)	16(43.2)	7(18.9)
12.Using wood-based to mix the pesticides is safety than using hand	Very Agree	19(35.8)	19(35.8)	15(28.3)
13.Pesticide can harm human and the environment	Very Agree	19(33.9)	22(39.3)	15(26.8)
TOTAL(MEAN ± SD)		**25.04±3.42**	**25.4±2.93**	**25.06±4.40**
TOTAL SCORE		**(47%) Poor attitude**	**(48%) Poor attitude**	**(49%) Poor attitude**

4.4 The practice of pesticide spraying

From the result it shows that, the pineapple has 78% of practice score, 75% practice score for vegetables and 74% practice score for rubbers pesticide sprayer which is all can be categorized as good practice of attitude of pesticide sprayers.

The result indicates that those working in the vegetable industry had the highest numbers never attending formal training in handling of pesticide. More them half of respondent always read labels on pesticide container before start spraying (56%), checking the spraying equipment (64%) and always avoid spraying near human and animal (62%) and mostly will choose pesticide that is suggested. Pineapples pesticide sprayer have lowest percentage of 9 questions out of 20 questions than rubbers and vegetables pesticide sprayers. The question that involved is mostly positive statements that consist of attending formal training, prepare of equipment before started spraying, practice of mixing pesticide, and cleaning of pesticide containers.

Approximately only 43.1% of vegetables pesticide sprayer followed proper disposable procedures of pesticide container by not disposing into the river or reservoir after had been fully used compared to 50% of rubbers and 25% of pineapples pesticide sprayer who are sometimes thrown the empty pesticide container into the river. Nearly half of rubbers (42.9%) never burn empty pesticide container. The study shows that

pineapple pesticide sprayers had 10 good working practice compared to vegetable (7 good working practices) and rubbers pesticide handlers having the lowest good working practice (5 good spraying practices). For the overall score, it indicates moderate practice for the entire 3 different plantation.

Table 4.4: The current practices while spraying among pesticide sprayer

Items	Chosen Answer	Pineapples n(%)	Rubbers n(%)	Vegetables n(%)
			N=96	
1.Training on handling pesticide before started spraying.	Never	6(24)	10(40)	9(36)
2.Wear glove and mask during mixing pesticide.	Usually	21(35)	19(31.7)	20(33.3)
3. Read label and follow instruction before started spray.	Usually	18(32.1)	19(33.9)	19(33.1)
4. Check equipment and material of spraying before use it.	Never	1(8.3)	5(41.7)	6(50)
5. Avoided human and animal from spraying area.	Usually	22(35.5)	22(35.5)	18(29)
6. Select pesticide as it have been recommended	Usually	24(35.3)	22(32.4)	22(32.4)

Items	Chosen Answer	Pineapples n(%)	Rubbers n(%) N=96	Vegetables n(%)
7. Inhale pesticide for confirming the type of pesticide	Sometimes	3(37.5)	2(25)	3(37.5)
8.Mix pesticide by hand	Never	21(28.8)	22(30.1)	30(41.1)
9.Wearing safety boot during spraying	Usually	20(29.9)	21(31.3)	26(38.8)
10.Smoking while performing spraying	Never	21(30.4)	23(33.3)	25(36.2)
11.Spray pesticide while windy	Usually	9(36)	14(56)	2(8.0)
12.stand windward direction while spraying without protective equipment	Never	12(22.6)	15(28.3)	16(49)
13. Cleaning pesticide containers by using water from river after finish sprayed.	Never	16(37.2)	10(23.3)	17(39.5)
14. Disposed pesticide containers in river after used	Usually	5(41.7)	5(41.7)	2(16.7)
15. Cleaning pesticide applicator with detergent before storage	Never	13(26.5)	16(32.7)	20(40.8)
16. Cloths that wear must immediately change after finished sprayed.	Usually	24(35.3)	22(32.4)	22(32.4)
17.Wash cloth immediately after used it for spraying	Usually	7(25.9)	10(37)	10(37)

Items	Chosen Answer	Pineapples n(%)	Rubbers n(%)	Vegetables n(%)
			N=96	
18. Store pesticide in storage room	Sometimes	1(50)	1(50)	0(0)
19. Empty pesticide containers should be burned or buried	Never	8(19)	18(42.9)	16(38.1)
20. Always wash hand and was face before having meal after sprayed immediately	Usually	20(29.4)	24(35.3)	24(35.3)
MEAN±SD		**65.3±8.65**	**62.8±11.6**	**62.4±12.31**
TOTAL SCORE		**(78%) Fair practice**	**(74%) Fair practice**	**(75%) Fair practice**

4.5 The association of KAP between PPE uses among pesticide sprayers

The variables of KAP have been tested to each PPE. The result shows that, there is a significant association between knowledge, attitude and practices with the use of PPE. Based on Table10, all the practices, attitude and practices observed during pesticide transportation, mixing, spraying and while washing the container had significant association ($p<0.005$) with PPE used (i.e. : the use of boot, mask, glove, mask, long sleeve shirt and long pant) except for the attitude of using apron ($p>0.05$).

Table 4.5: Association of KAP between PPE uses among pesticide sprayers

VARIABLE	ACTIVITY	PPE		X^2	P
		NO (%)	YES (%)		
Practice	**During pesticide transportation**				
	The use of boot	11.5	88.5	50.96	0.005**
	Mixing of pesticide				
	The used of mask	21.8	78.2	53.083	0.029*
	While spraying pesticide				
	The used of glove	16.1	83.9	59.23	0.009**
	The used of mask	19.5	80.5	57.85	0.012**
	The used of long sleeve shirt	18.4	81.6	53.91	0.028*
	While washing pesticide container				
	The used of long pants	16.1	83.9	51.204	0.048*
	The use of boot	14.9	85.1	54.22	0.026*
Attitude					
	While mixing pesticide				
	The used of glove	16.3	83.7	32.19	0.009**
	The used of mask	20.9	79.1	29.25	0.022*
	While spraying pesticide				
	The used of glove	15.1	84.9	37.681	0.002**
	The used of mask	18.6	81.4	27.83	0.033*
	The used of long sleeve shirt	17.4	82.6	29.29	0.022*
	The used of long pants	14	86	27.083	0.041*
	The use of boot	14	86	27.848	0.036*
	The used of apron	40.7	59.3	25.97	0.055
	While washing pesticide container				
	The used of glove	20.9	79.1	33.36	0.007**
	The used of long sleeve shirt	17.4	82.6	26.78	0.044*

	The use of boot	14	86	35.06	0.004**
Knowledge	**During transport pesticide**				
	The used of glove	16.3	83.7	30.92	0.006**
	The use of boot	10.5	89.5	27.145	0.018**
	While mixing pesticide				
	The used of mask	20.9	79.1	32.07	0.004**
	The used of long sleeve	17.4	82.6	28.8	0.011**
	The used of long pants	15.1	84.9	38.93	<0.001***
	The use of boot	15.1	84.9	44.78	<0.001***
	While spraying pesticide				
	The used of glove	15.1	84.9	50	<0.001***
	The used of mask	18.6	81.4	46.34	<0.001***
	The used of long sleeve shirt	17.4	82.6	40.08	<0.001***
	The used of long pants	14	86	39.86	<0.001***
	The use of boot	14	86	43.97	<0.001***
	The use of cap	30.2	69.8	25.801	0.027*
	While washing pesticide container				
	The used of glove	20.9	79.1	41.88	0.00***
	The used of long sleeve shirt	17.4	82.6	27.11	0.019**
	The used of long pants	15.1	84.9	34.12	0.002**
	The use of boot	14	86	43.7	0.00***

***p value <0.001

** p value <0.01

* p value <0.05

4.6 Comparison between KAP findings of pesticide use between managements at different agriculture area.

Table 4.6 shows the comparison of KAP finding between managements at 3 different areas. The result shows that there is no significant different of practice, attitude and knowledge ($p>0.05$) among the 3 different plantation. In term of the KAP scores, the practice score show that pineapple management has the highest score of 86% compared to 84% for rubbers management and 82% of vegetables management. The practice indicates as a good practice. For the attitude score, vegetable management had higher attitude score of 49% compared to rubbers management (43%) and 44% for pineapple management. The result categorized as a non-concern attitude. From the aspect of knowledge score, 85% for both pineapple and rubbers management whereas 83% for vegetables management. The result indicates that all of the management had high level of knowledge

For the attitude score, vegetable management had higher attitude score of 49% compared to rubbers management (43%) and 44% for pineapple management. The result categorized as a non-concern attitude. From the aspect of knowledge score, 85% for both pineapple and rubbers management whereas 83% for vegetables management. The result indicates that all of the management had high level of knowledge.

Table 4.6: Comparison between KAP findings of pesticide use between managements at different agriculture area

KAP	Industry	Score (%)	Classification	Mean	Standard Deviation	F	P value
Practice	Pineapple	86	Good Practice	72.00	8.287	0.349	0.711
	Rubber	84		70.80	1.643		
	Vegetable	82		69.11	6.412		
Attitude	Pineapple	44	Non Concern	22.75	8.057	0.479	0.629
	Rubber	43		22.80	4.324		
	Vegetable	49		25.22	4.353		
Knowledge	Pineapple	85	High knowledge	12.75	2.500	0.050	0.951
	Rubber	85		12.80	2.280		
	Vegetable	83		12.44	2.128		

CHAPTER 5

DISCUSSION

5.1 Socio Demographic

In this study, majority of the respondent was Malaysian (67.7%) whereas the others was foreigner (32.3%). In this study, the results showed that male (88.5%) has higher percentage worked at agriculture field than female (11.5%). The average male participant was 46 years old. It have been proved by study from Gaza strip, stated that there are significant difference of pesticide use between male and female (Yassin *et al.*, 2002).

Based on pesticide sprayer's educational level, most of them had secondary school education. Therefore they are able to understand the health hazards of relevant pesticide, become familiar with and adopt proper work practices, use protective equipment properly, and practice personal hygiene measure and suitable PPE for each job task. However, there are still numbers of respondent (6.3%) who are not receiving formal education. Low education levels of the rural population, lack of information and training on pesticide safety, poor spraying technology, and inadequate personal

protection during pesticide use have been reported to play a major role in the intoxication scenario (Hurting *et al.*,2003). Several studies Recena *et al.*,(2006); Salameh *et al.*,(2004); Sivayoganatha *et al.*,(1995); Yassin *et al.*,(2002) from developing countries have shown nearly similar results, especially on pesticide use knowledge and protective measures, of the fact that most users in such nations are illiterate, ill-trained, poor and subsistent.

From this study, job category have been divided by two which are mixing activities (45%) by performing job rotation including dealing with pesticide and do specific job task as pesticide sprayers (55.2%). Rubbers plantation mostly have their own workers who only do pesticide sprayer however, for vegetable and pineapple plantation workers they need to do job rotation because they have small number of workers.

5.2 Knowledge of Pesticide sprayers

Based on study by Koh and Jeyaratnam,(1996), Farmers' knowledge about hazards is important for the prevention of acute poisoning. Erroneous beliefs can seriously impair workers' capacity to protect themselves against risks. Majority of pesticide sprayers (96%) has known that pesticide can affect human health and kill stock animal (88%) and plant (88%).

Majority 38% of the vegetables growers agreed that there are waiting period after pesticide sprayer but disagreed by pineapple and rubber pesticide sprayers. Waiting period is the duration after which the vegetables treated with pesticides can be used. Almost more than a half of vegetable growers pick the vegetable at the interval of 1-5 days after the application of pesticides. Less waiting period indicates that there is a higher risk of presence of pesticides residue in vegetables which poses higher health risk to vegetable growers as well as consumers.

The majority of information about pesticide was obtained through informal sources such as agriculture officer, newspaper, pamphlet, talk and social network. This had been proving that pesticide information service was developed and a pilot information system was launched throughout the country. It is part of the Integrated Drug and Poison Information Service (IDPIS) of the Malaysian National Poison Centre. The primary aim of the IDPIS is to disseminate information concerning health-related matters, especially with regard to drug usage and poison control, to health professionals and the public alike (Razak *et al.*,1991).

From the result also, it indicates that majority 50% of vegetable pesticide sprayer disagree that poisoning symptom will be appear in 24 hour. It also had been denied by rubber (35.7%) and pineapple pesticide (7.1%) sprayers. Pesticide poisoning may be obvious when a person is exposed to very high levels from an accidental spill or

splash. However, pesticide poisoning is often hard to recognize because the effects vary from person to person, the symptoms may be similar to those of other ailments such as flu, cold and hangover or symptoms may not appear immediately. Pesticide poisoning can happen from one short exposure (acute poisoning) or from many exposures over a long time (chronic poisoning).

Both acute and chronic poisoning can exhibit mild, moderate or severe symptoms. Approximately majority of pineapple pesticide sprayers (44.2%) followed by rubbers (20.9%) and vegetable (34.9%) pesticide sprayer agreed, they need to bury the used up empty containers by digging a deep hole and must be distance from water sources. However, from aspect of environment, burying rinsed pesticide containers of use is not an ideal solution. It potentially uses up scarce land and can be a danger to animals. Plastic containers are highly stable and do not biodegrade, therefore if buried, the container will remain intact indefinitely. Burying containers is not easy because the characteristics such as void space inside the container and its low density. This will lead to the container to rise gradually to the surface of the soil. As such, burying at the place of use is not a viable solution (WHO, 2008).

A high level of knowledge was recorded among the respondent who had a higher education level. The assessments of pesticide use in farm workers were done by Salameh *et al.*, (2004) was reported higher levels of knowledge of pesticide use, but the use of protective measures are poor. Farmers workers with good pesticide knowledge

were more inclined to use pesticides according to the recommended guidelines for protective measures.

5.3 The attitude of the pesticide sprayers

The attitude of sprayers sometimes was based on learning from their community (neighbors, family and local belief) and no technical basis. Example of these included drink and coconut juice after spraying to excrete toxicity. Highly percentage of believing in negative attitude statement may encourage agricultural workers to be unconcern to the used of protective measure. In this study, rubbers pesticide sprayers highly believed about drinking of coconut juice after exposed to pesticide can reduce toxicity followed by pineapple (35.3%) and vegetable (23.5%) pesticide sprayers. There are still no proved from scientific research or from previous study about the effectiveness to cure the poisonings.

The study showed that 35.6% of pesticide sprayer for both rubbers and vegetables sprayer, followed by pineapple pesticide sprayer (28.7%) disagreed that by increasing the volume of pesticide in one time can prevent resistance. This is because overdosing is expensive as it wastes pesticide and increases the potential for groundwater contamination. However, under dosing may not give the desired coverage and control needed. It have been proved by Wesseling *et al.*, (1997) and Wilson,(2001)

concluded that farm workers in developing countries will continue to use pesticide in increasing quantities because of lack of alternative to pesticide, ignorance of pesticide use and weak enforcement of regulation and laws of pesticide use.

Approximately 38% of pineapple pesticide sprayer followed by rubbers (35.8%) and vegetables pesticide sprayer (26.7%) very agreed that stands against windy direction while spraying pesticide has the possibility to be expose to poison. From the survey, pineapple pesticide sprayers was very concerned with the wind direction because the condition of their plantation with wide field and small trees. The type of open environment will increase windy condition and has the possibility to spread to human.

The result shows that 56.5% of rubber pesticide sprayers followed by pineapple and vegetables both disagreed (21.7%) about mixing with different type of pesticide in one time will increase effectiveness. Previous study by Allaby M, (1994), stated that the prevalence of mixing two or more pesticides and using more than the recommended concentration of pesticide was high among interviewed farm worker and this practice could put the farm workers at risk, due to synergistic or potentiating effect of chemicals. This statement was depends on type of pesticide. Two or more pesticides, or a pesticide and a fertilizer, are compatible with no adverse effects occur as a result of mixing them together. Factors such as temperature, tank pH and length of time the spray mixture in the tank before spraying. Physical incompatibilities usually involve the inert ingredients

of a formulation. The mixture may become unstable, forming crystals, flakes, or sludge that may clog spray equipment.

In term of safety issues associated with the preparation and application of pesticides, there are several important problems related to pesticide use that is important to pesticide sprayer to know. About half of the vegetable pesticide sprayer (50%), and a small percentage of rubber (33.3%) and pineapple pesticide sprayers (16.7%) did not know the importance of using complete PPE in preventing exposure to pesticide. The percentage is large enough to contribute in the poisoning cases. This finding is supported by previous study Woodruff *et al.*, (1994) that the use of complete PPE will decrease the health effect of pesticide and poisoning cases.

5.4 The practice of pesticide use among sprayers.

The practice of pesticide in small area plantation especially who are not under responsible of any organization, sometimes they overuse pesticide and use pesticide that are not recommended. They have very weak institutions for regulating pesticide use and sales. Owing to such factors, farmers do not take account of sustainability of pesticide use and ignore costs of pesticide pollution. Easy availability of pesticides in local market because of lack of implementation of pesticide rules and regulations, unwillingness to risk economic losses due to poor economic conditions and low share of pesticides on total produce due to cheap price of pesticides further exacerbate the situation.

Less than half of the pesticide sprayer always read the pesticide label prior to spraying to avoid misuse of pesticide. It is recommended that the label must be protected and readable. If the pesticide transferred into smaller container, it must be made of a suitable material to hold the pesticide safely. Practice of maintaining personal hygiene decreases risk of health hazards.

From the result, it stated that rubbers pesticide sprayers (40%) has highest number of the workers that never attending formal training followed by vegetables (36%) and pineapple pesticide sprayers (24%). Pesticide sprayer should able to attend formal training before handling and applying pesticide sprayers. Based on aspect of pesticide sprayer attitude, WHO recommended that the use of pesticide only by trained people (WHO, 1991). Training on pesticide management should be given and covers topics on safe product handling, delivery of the product and instruction on using spray equipment. The result shows that not even half of them wear mask and glove during spraying. This demonstrates that, Malaysian pesticide sprayers do not concerned on the use of PPE.

One of the dangerous practices is the inhalation of pesticide for confirming the type of pesticide. Nearly 40% to 25% of them practice the dangerous use of inhaling pesticide for conformation. This study showed that sometime the pesticide sprayer tended to prepare and store pesticide at home, a practice which might expose to children and adult. The result shown that rubbers pesticide sprayer (42.9%), followed by vegetables (38.1%) and pineapple pesticide sprayer (19%) never burned or buried empty pesticide container. From the survey, the pesticide sprayer of vegetable and pineapple plantation, they collect all the used up empty pesticide container and transported to recycling center. But for rubber pesticide sprayer, they do not transport to recycling center but they recycle by their own. The best way to rinse the empty pesticide container by three times rinse method before disposal (Department Of Agriculture, 2001).

5.5 The association of KAP between PPE uses among pesticide sprayers

From the interview, approximately half of the respondent only receives the personal protective equipment at only starting the job, if the PPE was damaged or worn out the workers must purchase again by their own. There is also, some small holder company which is not under MARDI such as vegetables plantation never provided PPE to workers. Most of these small shops sold personal protective equipment which did not conform to any standards and were sold at a low price. Many employer and employees were tempted to select these devices without knowing the hidden hazard.

The use of personal protective equipment usually implies that the worker is expected to operate in a potentially hazardous environment with the protective device as one of the key means of preventing exposure. It is, therefore, vital that the effectiveness and reliability of the device is ensured. Unfortunately, personal protection is often seen as an inexpensive solution of controlling occupational hazards. Little consideration is given to the selection of suitable and effective device, the maintenance of the device and the training of persons using the device.

Personal protective equipment is designed to safeguard against both acute and chronic pesticide poisoning and generally includes products that prevent absorption of pesticide through skin, eyes or through inhalation. Personal protective equipment commonly for use when applying pesticide includes goggles to protect the eyes, chemical resistant gloves to protect hands, coverall to protect legs, arms, torso and groin, respirator with correct filter cartridges to prevent inhalation of pesticide in gas, mist or droplet form, rubber or PVC boots to protect feet, washable or chemical resistance hat to protect head and scalp and PVC apron for use during mixing.

From the association between KAP and PPE, it is clearly shown; pesticide users were knowledgeable about the importance of the use of personal protective equipment to prevent them from poisoning. When transporting pesticide, the use of safety boot had significantly associated with pesticide use. The use of boot and glove will prevent slippery and spill during transportation. From aspect of mixing pesticide, pesticide should be measured and mixed in areas that are well-ventilated, level, well-lit, and with supply of clean water. While mixing also need to focus on area with an impervious floor allows for spill to be cleaned up.

The important PPE to use while mixing is mask, glove, long pants, and long sleeve shirt. While spraying and washing, the commonly PPE that important to use was apron, long sleeve shirt, long pants, mask, glove, and goggle. Goggle was important to protect

eyes from splashing of pesticide while spraying ad washing. As stated by Awang *et al.*, (2011) shows that poisoning occurred among 14.5% of the 4,531 farmers growing vegetables, flowers and fruits in the Cameron Highlands. Most of PPE was given by the management except those who is not under RISDA, MARDI or MPIB organization. PPE is under their personal responsibility and is not claimable under the management. Fitness test for PPE usage is not taken consideration by the management and this lead to incorrect use, constant discomfort and lack of motivation for PPE use.

A study by the Consumer Association of Penang (CAP, 1996) revealed that as many as 90 per cent of the farmers surveyed did not observe safety measures while handling pesticides. Used pesticide containers were disposed off in water areas, and none of the farms displayed the notice "Danger: Pesticide Sprayed Area, No Entry to Unauthorized Persons", as stipulated by regulations. Based on finding there is significant relationship between Knowledge, Attitude and Practice with use of Personal Protective Equipment..

5.6 The comparison KAP findings of pesticide use between managements at different agriculture area.

Management workers were very important to educate pesticide sprayers especially in compliance of PPE form aspect of practice and knowledge of important use PPE. The Occupational Safety and Health Administration (OSHA) require the use of PPE to

reduce employee exposure to hazards when engineering and administrative controls are not effective. However, enforcing its use and addressing worker objections can often be a challenge for employers. From aspect of practice among management and pesticide sprayer there is no significant difference observed. Pineapples pesticide sprayers and their management show highest score in practice of pesticide use compared to rubbers managements and pesticide sprayers.

It had been shown that pineapple plantation had a systematic management in which they have to arranged multi-tasking for their pesticide sprayer to perform others task such as planting the seed, cutting, and harvesting the pineapples. Pineapple management had to rotate work task as they have limited numbers of workers. Related to practice, burning empty pesticide containers in open fires or burying empty container should not be used as method of management and disposal of empty pesticide container. Distributors and management should be discouraged and appropriate management encouraged. Safe burning procedure requires a good understanding of pesticide chemistry and adequate knowledge behavioral pesticide.

Based on the finding from the attitude scores, rubbers management's shows better attitude compared with management in pineapple and vegetable plantation. However, for the total scoring of attitude, 44% for pineapple management, 43% for rubbers management and 49% for vegetables management considered as having poor attitude. From the aspect of pesticide sprayer, there was also all of them has a poor

attitude. This shows that the management of all the three plantation and pesticide sprayer do not have enough information regarding pesticide. There is no systematic safety audit to increase their performance in managing pesticide. Moreover, information, instruction and training of pesticide sprayer are not promoted, since these activities are fundamental aspect of health protection.

However, there is no significant different from the aspect of management knowledge between the three types of plantation. Therefore, hypothesis was accepted. This shown that, management and pesticide sprayer had the knowledge of managing pesticide. However, the practice is very poor especially related to the use of PPE. The high cost of PPE was important factor in the limited use as well as the uncomfortable to use it especially in tropical climate.

5.7. Study Limitation

There are several limitations in this study:

1. Study does not investigate deeper on the worker toxicity symptom and only determining the knowledge, attitude and practice of pesticide user.

2. This study was conducted in 3 specific agricultural only and may not be generalized as representative for all agricultural industries.

3. The outcome of this study was measured by the answers of respondents from the self-administered questionnaires. Therefore, the results of this study are based entirely on the respondent's honesty and how they perceived their attitudes towards the variables used in this study.

5.8 Conclusion

- From the aspect of knowledge, pineapple pesticide sprayer and their managements has higher score than vegetable and rubbers.

- The pineapple, vegetable and rubbers pesticide sprayers, all of them have poor attitude. Whereas, their management have non concern attitude

- From aspect of practice the pineapple, vegetable and rubbers pesticide sprayer, all of them was having a fair practice.

- There are have association KAP study between uses of PPE among pesticide sprayers

5.9 Recommendation

The recommendation that can be applied on knowledge, attitude and practice of pesticide use was mostly effective in administrative control. The first and foremost way to overcome such difficulties is to educate workers by implement intervention safety program, the government authorities and community should have appropriate strategies to develop the education levels in the rural area and add the knowledge on other alternative for pest control and pesticide safety education. Next, training of effective use of personal protective equipment also need to be improve by implement it twice a year. Training of safe work procedure also very important especially for new workers and it is good practice for education sessions to be held periodically to promote ongoing awareness about safety of their job task.

Next, the ways to improve was through open communication. Listening to the employees can make a world of difference. Involve employees in discussions concerning what specific PPE brands, colors and models to purchase since they'll be the ones using it during the workday. Ask employees how their PPE is working for them and what recommendations they have for the next time purchasing PPE. Address complaints promptly, and keep open communication with employees in an effort to provide the most comfortable and appealing equipment possible. Procedure that encourages prompt

and accurate reporting of signs and symptoms by employees so that they can be evaluated and, if warranted, treated.

Management also should consistently provide the Personal Protective Equipment (PPE) based on the workers need. If the workers purchased by their own, they might not consider the effectiveness of PPE but they only choose because of the low price. Some of the organization of smallholding company only provide once only at first they started work, then if damaged or worn out of PPE , the workers need to purchase by their own. So, for the aspect of health of workers, the management should not take it lightly and take prompt action if the workers ignore of wearing PPE.

From the observation also, the facilities for washing and toilet facilities also away from the field so it will be a little bit difficult for sprayers who are away in the fields to get water immediately if there are splashing of pesticide or spill of pesticide. Management should provide some solution for the workers to overcome this problem for example, mobile toilet that can be access easily when workers away from field.