

Supplementary Materials

Organophosphate pesticides in herbal mixtures from Bayelsa State, Nigeria: implication for human exposure and risks

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Supplementary Table 1. Information regarding the herbal mixtures sampled

Name	Nature	Ingredients	Indication	Origin	Manufacture date	Expiry date	NAFDAC No
IFECO staph flusher	Liquid	<i>Moringa, Moringa Lucida, Permillia Avicennioides, water</i>	For treatment of staphylococcus, gonorrhoea, syphilis, vaginal discharge, urinary tract infections, hepatitis, infertility, wasit pain, stomach noise	Amarata, Yenagoa, Bayelsa State.	1/5/22	1/4/26	A7-100280L
Pure Ginseng eye cleanser	Liquid	-	For all types of eye problem such as glaucoma, cataract, short and long-sightedness, itching of the eye, redness of the eye etc.	Ogbani, Onitsha	06/20	05/24	001/07/20
Dr. Iguedo's Goko cleanser herbal mixture	Liquid	-	For: prevention of typhoid fever, removing accumulated toxin, enhances appetite and restores balance of the cell structure, eliminates worm, enhances body energy, reduces accumulated fat and cholesterol level, regulated monthly menstrual cycle, prevents oedema and numbness, regulates blood sugar.	Ago-Okota, Isolo, Lagos.	12/22	12/25	A7-0804L
Kambest Pain Killer Rheumatism Destroyer	Liquid	Powerful roots, herbs and leaf	For: killing pains, rheumatism, wasit pain, joint pain, arthritis, rheumatoid-arthritis	East LGA, Enugu State	3/12/22	2/12/26	2491-NAN-TMP
Med-Bunch Herbal Mixture	Liquid	Cleistopholis patens, xylophia	Treatment of staphylococcus aureus, gonorrhoea, syphilis,	Owa Ezeagu,	2/22	2/26	A7-2124L

		aethiopica, securidaca longepedunculata, magnifera indica, moringa lucida, zanthoxylum zanthoxylloides, Zingiber officinale, treated water	fibroid, pile, ulcer, lack of sexual feeling, hepatitis A and B, controls body weight, blockage of fallopian tube, quick ejaculation, malaria, typhoid fever, urinary tract infection (blockage), rheumatism and arthritis, painful menstruation, watery sperm, low sperm count. It also purifies and detoxifies blood.	LGA, Enugu State			
Pro Life Herbal for diabetes	Liquid	Microdesmus teayaya, carpolobia lutea, purified water	For the treatment of diabetes type 1 &2, high blood sugar	Awka South, Anambra State	11/2022	12/2024	-
Mai sasangi male sexual enhancement	Liquid	Ficus carica 1%, honey 3%, water, Detarium Senegalese	Weak erection and premature ejaculation	Minna, Niger State/ Jogara,Kano State	01/01/23	01/01/25	A7-4720L
3000 herbal mixture	Liquid	Citrus aurantifolia 0.5%, Psidium guajava 0.5%, xylophia oethiopica 1.0%, sesamum indicum 1.0%, magnifera indica 2.0% and water	Weak erection, low sperm count, watery sperm, impotency, quick ejaculation	Nkweke- Elunak, Oyi LGA, Anambra State	20/01/22	20/12/25	A74176L
Elcocyn-DS Herbal mixture	Liquid	Organic fruits, herbal leaves and roots	For treatment of: constant miscarriage, belly hotness, low or lack of oestrogen, waist pain, premature labour, post-coital bleeding	Delta State	2/2020	1/2024	A7-2952L

			(Tricomomiasis), milkish discharge, urethral disorder, blockage of fallopian tube.				
Super 7 herbal mixture	Liquid	Antiaris toxicaria, Anthacleisia vogelii, Aloe vera, Aedirachita-indica, Carica papaya, Moringa oleifera, Xylophia aethiopica, treated water	For the treatment of: Gonorrhoea, syphilis, staphylococcus, menstrual pain, candidiasis, E. coli, low sperm count, malaria, hepatitis, diabetes. It also neutralizes chemical and human toxin, treats body pain, waist pain. It is also an immune-booster	Anambra State	2/2023	2/2026	A7-2061L
Herbal mixture blood purifier	Liquid	Aloe barbadensis, xylophia aethiopica, Gongroneria latifollum, Dichrostochys cinera, water 'q'	For the treatment of: gonorrhoea, gono-syphilis, gono-arthritis, staphylococcus aureus, stomach noise, gastric menstrual pain, menstrual irregularities, fibroid, stomach noise, gastric intestinal disease, amoebic dysentery	Delta state	01/5/26	30/4/26	A7-1370L
Jami'Ul Khairi	Liquid	In Hausa language: Tamaridus, indince, moringa, aloveral honey & maganism turmeric & black seed	For the treatment of gonorrhoea, syphilis, pelvic pain, abdominal pain, water, vaginal discharge, vaginal odour, vaginal rashes. It also flushes out dead sperm, promote sexual performance permanently.	-	25/11/23	25/11/24	-
IFECO Herbal remedy	Liquid	-	Staphylococcus, gonorrhoea, syphilis, vaginal discharge,	Anambra state	1/5/22	1/4/26	A7-100279L

			urinary tract infections, hepatitis, infertility, waste pain, stomach noise.				
Goody cleanser bitters with Aloe vera & moringa	Liquid	Citrus aurantifolia leaves, magnifera indica leaves, Vernonia amygdalina leaves, saccharum officinarum leaves, aloe barbadensis muller, Allium sativum, moringa oleifera, caramel, water	Reduce blood sugar level, improves fertility, prevents typhoid, waist pain, gonorrhea, syphilis, staphylococcus, promote men sexual performance, prevents bacteria infection, boosting immune, helps build nutrition.	Badagry, Lagos	-	-	A7-1689L
Asheitu Adams Bitters	Liquid	Pterygrotia macrocarpa, Colocynthis citrullis, Strophantis spp., Nauclea lactifolia, Cascara, water	For the treatment of: Pile stomach trouble, waist pain, anaemia, free bowels, mensuration problem, ulcer, sexual weakness, worms, fever, headache, rheumatism, eyesight, pregnancy disorder, hypertension, asthma, fibroid, diabetes, purifies blood & eliminates blood deficiencies.	Agege, Lagos	1/6/23	1/5/26	A7-1827L
Jalin herbal	Powder	Psidium guajava, Cymbopogon citratus, Zingiber officinale, Xylopiya aethiopica,	For the treatment of urinary tract infections	Abia state	19/5/2021	17/5/2024	A7-1695L

		ginseng					
Okanga powder	Powder	Citrus aurantifolia, Magnifera indica, Psidium guajava, Carapolobia lutea, Ritachia longipediculate, xylophia aethiopica, Nauciea diderichii	For the treatment of bacterial infections	Anambra state	6/2022	5/2024	A4-0071L
Omega roots + ginseng aloe vera	Powder	Carica papaya, Magnifera indica, Azadirachta indica, Jasminum officioli, aloe barbadensis, ginseng	For treatment of STDs	Anambra state	15/1/2022	15/1/2025	A7-2014L
Elcocyn-DS	Powder	Roots, Aloe vera, mistletoe, seeds (golden seal), Carica papaya, bark (white lotus)	For treatment of STDs	Delta state	12/2022	11/2024	A7-2125L
Lamjib	Liquid	Water, sorghum bicolor, Anogesus lelocarpus, Commiphora kerstingli, boswella odorata, cochiosper mumititorium, tamarindus indica, honey	For treatment of pile, typhoid, malaria, ulcer, manpower	Kaduna state	3/2023	3/2025	A7-2551L

Oodar	Liquid	-	Manpower	Kano state	1/2022	10/2025	-
Gbemidebeh	Liquid	-	For the treatment of infection	Oyo state	9/2022	8/2025	-
Magama herbal launea drink	Liquid	Vernonia, launea acida, moringa oleifera, Ocimum gratissimum, sodium citrate, menthol	For the treatment of infection, abdominal pain, vomiting, cold & catarrh	Jigawa state	1/2022	31/12/2024	-
Ifeco action +	Liquid	Moringa, moringa lucida, Terinalla aviceninoides, water	For the treatment of weak erection, low sperm count, watery sperm and quick ejaculation	Anambra state	01/7/2023	01/04/2027	A7-100280L
Jalin	Liquid	Honey, ginseng, lepidum meyeril, lirrosma ovata	For the treatment of sexual weakness in men	Abia state	02/02/2023	01/02/2026	A7-2077L
Jocacin Gluco-d for diabetes	Liquid	Phylantus nurisu, Persia aamericana, Carica papaya	For the elimination of diabetes and to lower excess sugar in the body	Imo state	05/2021	11/2024	-
T&M solution (Neem)	Liquid	Magnifera indica, Carica papaya, Citrus sinensis, Azadirachta indica, Cymbogon citrates	For treatment of typhoid and malaria fever (Plasmodium falciparum) & general feverish condition.	Lagos state	5/2020	5/2024	A7-1761L
U.C.D Herbal sperm booster	Powder	Seeds, leaves, fruit extra	To boost low sperm count, for weak erection, quick ejaculation treatment	Imo state	11/04/21	21/04/2027	A7-2167L
Clara herbal mixture	Liquid	Moringa oleifera, Gongronema latifolium, Psidium guajava,	For treatment of skin rashes, Nla, Jedi-jedi, diarrhea, dysentery, stomach upset	Anambra state	4/6/2023	3/6/2025	A7-2167L

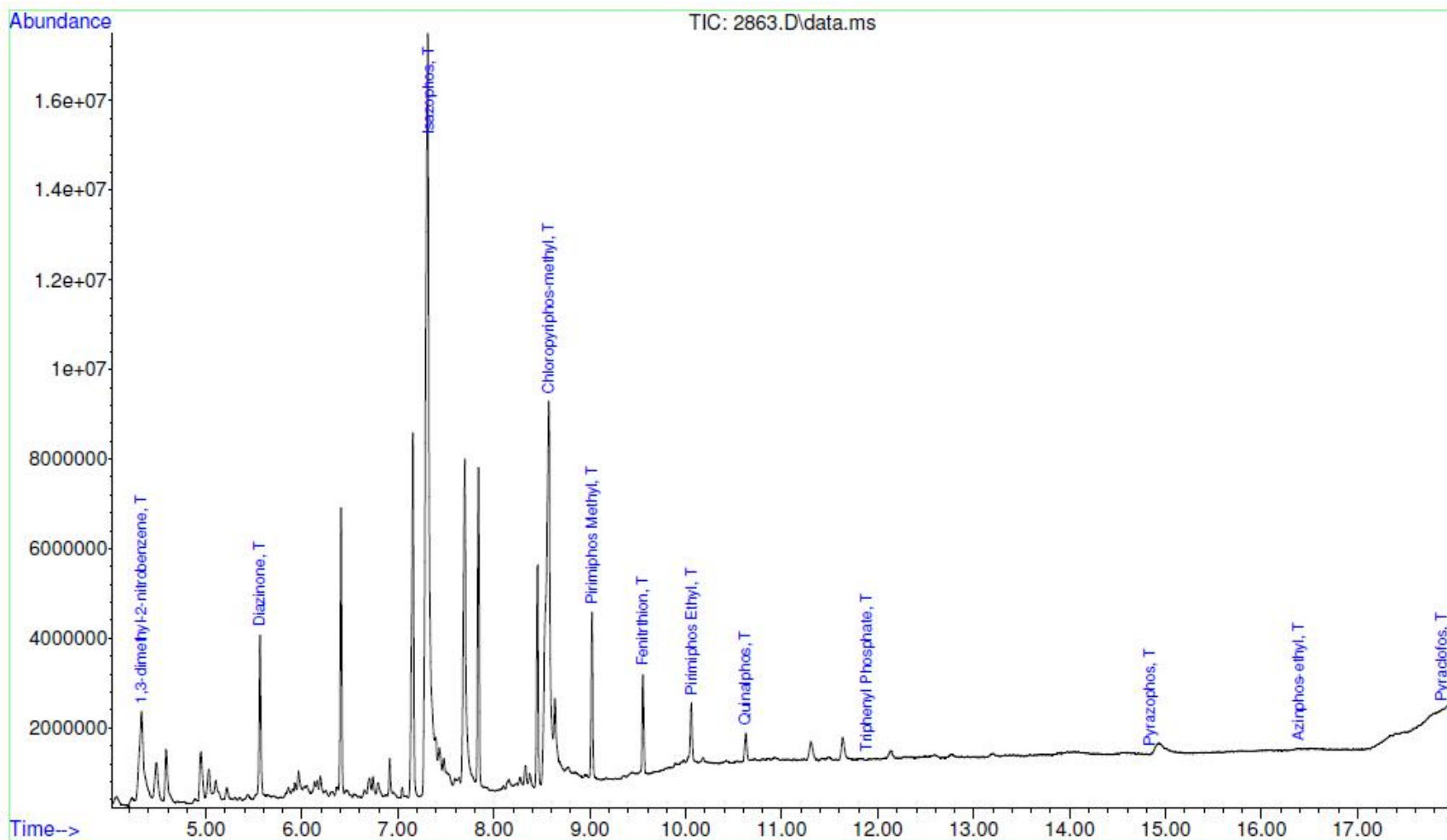
		Vernonia amygdalina					
Boom line cordial	Liquid	Water, citric acid, sugar, Sodium benzoate, lemon-line flavour, Greens E-142, Tartrazine E-102	-	Ogun state	19/01/23	12/25	01-3997
Chindus herbal mixture for prostrate	Liquid	Fruits, herbs and root water	For treatment of prostrate and urinary tract infection	-	9/2021	9/2025	0996
Deep root herbal mixture	Liquid	Cymbopogan citratus, Carica papaya leaves, Magnifera indica bark, Moringa oleifera leaf, Citrus limonia, Psidium guajava, Zingiber officinale root, Allium sativum, water	Used to manage feverish conditions such as malaria, typhoid, hepatic. It also treats gonorrhoea, fibroid, staph, syphilis, E. coli, menstrual problems, low sperm count, blocked fallopian tubes, weak erection, noisy stomach, problems of reproductive system, poor eye sight, rheumatism and arthritis, cholesterol and sugar level.	Enugu state	01/11/2022	01/10/2024	A7-0912L
Evaking Herbs blood purifier	Liquid	Kudin, Aloe vera, Allium sativum, Zingiber officinale, Juglans regia	For treatment of diabetes, high blood pressure	Anambra state	18/6/2022	17/06/2026	A7-2235L
Kambest prostate & urine infection	Liquid	Avocado, vegetable, bell peppers, garlic, olive oil, fresh-	For the treatment of prostate & urine infection	Enugu state	21/10/2020	20/10/2024	249191 Nantmp

		lemon juice, celery root, pumpkin seed					
Clara ulc anti-ulcer herbal mixture	Liquid	Ocimum gratissimum, Vernonia amygdalina, water, Gongronema latifolium	For treatment of stomach ulcer, stomach itch, stomach upset, gastric ulcer, heartburn, indigestion and hyper acidity	Anambra state	12/01/23	11/01/25	A7-4817L
Chindus herbal for high blood pressure	Liquid	Fruits, herb and root, water	For the treatment of high blood pressure and signs of partial stroke	-	2/5/2022	2/4/2027	Nantmp No.0996
Chindus herbal mixture for rheumatism & arthritis	Liquid	Herbs, fruits and leaves	For treatment of rheumatism, arthritis, waist pain, stroke & body pains	Anambra state	18/6/2022	617/6/2027	Nantmp No.0996
Simac herbal healing mixture	Liquid	Herbs, roots, fruits, leaves and bark	For body pains	Anambra state	01/2022	01/2025	001708
Biotrend ulcer solution (Ulmus rubra)	Liquid	Slippery elim (Ulmus rubra), Taraxacum, Zingiber officinale, mentha, Glycyrrhiza glabra, Allium sativum, Brassica oleracea	For treatment and management of peptic ulcer, gastric ulcer, duodenal ulcer, H. pylori, internal heat & general gastric intestinal disorder	Lagos	2020	2024	-
Kambest bossman ginseng and	Liquid	Ginseng, honey, Lepidium meynii, lriosma- ovata	To enhance sexual performance in men e.g. fight weak erection, fight	Rivers state	19/8/2021	18/8/2025	24919

honey			impotence, boost sperm count, fight waist pain, increase libido				
Rinbacin powder herbal blend	Powder	Echinaces angustifolio root, Hieracium polosella roots, Tropaeolu majus root, Similax aspera leaves, Eigeson canallensis seeds, Eugeries casyophellia seeds	Used for management of minor and acute STDs such as staphylococcus aureus, gonorrhea, syphilis and also used in treatment of jaundice, stomach ache, pile, painful mensuration and internal heat, stomach ulcer and noisy stomach	Abia state	4/7/2022	4/7/2025	-
	Capsule	Echinacea, Augustifolia, Afromomium melegueta, Garcinia kola, Xylophia aethiopica, Uvaria chamae, Arilopsis tabouens, Hillesia latifolia	Staphylococcus aureus, E. coli, Staphylococcus faccalis, hepatitis, Salmonella species, pneumonia, cystitis, candidiasis, vaginitis, dysmenorrhea, amenorrhea, pelvic inflammatory disease, syphilis, typhoid fever and prostritis	Anambra state	01/04/2023	31/04/2024	-
Kambest staphylococcus wiper	Caspule	Aloe vera, fenned flower, Zingiber officinale, ginseng, moringa oleifera, liquefied natural honey, Azadirachta indica (neem tree), Rauwofia	For treatment of staphylococcus aureus, candidiasis, white milk discharge, breastmilk discharge, itching, infertilityboth for male and female and toilet infection	Enugu state	8/11/2022	7/11/2026	-

		serpentina (Indian snake root)					
Kambest pile off	Capsule	Organic fruit, morning oil seed, powerful roots and herbs	For treatment of all types of pile, internal pile, external pile, bleeding pile, weak erection, back pain and hemorrhoids	Enugu state	10/11/2021	9/11/2025	24919
Go-BAC ovulation booster	Capsule	Seeds, roots, bark, herbs	For treatment of scanty ovulation, loss of energy and infertility	Anambra state	27/7/2021	26/7/2025	-
Jovacin plus	Powder	Coloncynthis Citrullus, uvana chamae, curculigo Pilosa, Alium stivum, Panax ginseng, Zingiber officinale, Bahamas, Barbados aloe, anunuebe	Used as analgesic, anti-bacterial, herbal cleanser and blood sugar control.	Abia state	9/2020	9/2024	A7-1875L
Rinbacin forte garlic and aloe vera plus	Powder	Enhinaces augustifolia roots, hieracium poisella roots, tropacolu majus root, sassafras officinaills roots, aloe vera, similas aspra leaves, alium sativum, cloves, Eugeries casyophelta seeds	Used for STDs such as staphylococcus aureus, candidiasis, vaginal discharge, offensive odour, syphilis, gonorrhea	Abia state	18/4/2023	18/4/2027	04-6368
Sekon powder	Powder	Zingiber	It is used for treatment of	Anambra	2021	2024	A7-0281L

		officinale, bitter kola, musa paradisiaca	heartburn, frequent stooling, vomiting, worm and upset stomach	state			
Aloe vera action cough killer antibiotics	Powder	Aloe vera	Treatment of cough, TB cough, smoking, chest pain, back pain, liver issues	Ogun state	-	-	-
Goodnews herbal mixture	Powder	Magnifera indica, Carica papaya, Psidium guajava, breadfruit, Masularia acuminate, citrus lemon, ZIngiber officinale, Cymbopogon spp	It is used for treatment of joint pain, painful period, vaginal discharge, syphilis, gonorrhoea, noisy stomach, staphylococcus aureus, malaria, typhoid, general body weakness	Imo state	8/2020	12/2024	A7-0240L



Supplementary Figure 1. Representative chromatogram of OPPs in the herbal mixtures

The definition and values of variables in equation 2

Where, EF = exposure frequency (day/yr) = 350; ED = exposure duration = 6 and 30 years for children and adults respectively; ATnc = averaging time for non-cancer = ED x 365 and RfD = oral reference dose. The RfD values used were chlorpyrifos (1×10^{-3}), chlorpyrifos methyl (1×10^{-2}), diazinon (7×10^{-4}), pirimiphos methyl (7.3×10^{-4}), quinalphos (5×10^{-4}), azinphos ethyl (3×10^{-3}) and EPN (1×10^{-5}).

Supplementary Table 2. OPPs concentrations in the individual herbal mixtures

		Diazinone	Isazophos	Chloropyrifos Methyl	Pirimiphos Methyl	Fenitrothion	Pirimiphos Methyl	Quinalphos	Chlorpyrifos	Triphenyl Phosphate	EP N	Phos alone	Pyrazophos	Azinphos Ethyl	Pyra clofos	TO TAL	
Liquid	LH M1	1.40	3.86	1.27	6.41	3.88	0.53	3.36	ND	0.08	ND	ND	0.10	0.38	0.80	22.1	
	LH M2	0.36	0.86	2.80	2.43	1.93	1.20	0.70	1.24	2.87	2.3	4	3.15	ND	0.75	0.02	20.7
	LH M3	1.28	6.56	6.20	1.59	3.85	1.23	0.87	3.38	2.01	2.8	5	1.07	2.88	1.11	1.26	36.1
	LH M4	6.14	1.12	0.04	0.80	1.74	1.09	N.D.	0.25	1.08	0.8	1	ND	0.33	0.28	0.12	13.8
	LH M5	1.21	1.10	4.77	2.52	3.24	1.05	1.47	1.46	2.55	1.5	9	1.89	1.37	0.51	0.24	25.0
	LH M6	1.70	1.34	2.15	1.41	2.17	3.02	1.68	2.84	1.95	0.7	1	0.15	0.68	0.48	0.68	21.0
	LH M7	3.02	8.88	1.36	4.43	5.99	1.89	0.74	1.12	2.38	1.7	5	1.36	0.04	ND	0.01	33.0
	LH M8	4.86	4.64	8.74	4.71	0.58	0.07	3.76	2.47	2.52	1.3	6	0.46	0.73	0.70	0.04	35.6
	LH M9	4.06	5.23	10.6	4.30	5.67	5.11	3.83	1.26	2.69	2.6	2	0.28	0.71	0.89	0.69	48.0
	LH M10	1.02	3.21	2.65	1.79	4.77	1.35	3.25	0.84	2.70	0.0	ND	ND	ND	ND	ND	21.6
	LH M11	5.78	2.70	2.27	0.26	ND	1.05	0.59	ND	0.11	0.4	1	0.50	ND	ND	ND	13.3
	LH M12	4.65	1.34	3.11	0.23	0.15	0.70	0.05	0.02	0.10	0.1	1	0.35	0.57	0.70	ND	12.4
	LH M13	3.22	1.78	7.81	0.26	0.18	ND	0.26	0.02	ND	0.6	ND	0.38	0.01	0.01	ND	13.9
	LH M14	12.9	0.56	4.21	0.33	0.35	0.19	0.36	ND	ND	5	0.05	ND	0.04	ND	ND	19.6

LH																
M15	2.84	1.19	3.55	0.28	0.22	0.67	0.24	ND	0.01	ND	0.01	0.56	ND	ND	9.57	
LH										1.6						
M16	1.00	2.77	7.77	0.22	2.82	ND	0.27	1.75	2.54	0	0.16	ND	ND	0.57	21.5	
LH										2.0						
M17	4.72	1.50	3.30	1.30	ND	7.28	0.07	ND	2.79	4	ND	4.94	0.78	ND	28.7	
LH										3.7						
M18	1.04	0.09	ND	0.78	0.28	ND	0.08	1.07	0.49	9	0.76	4.84	0.34	2.59	16.2	
LH																
M19	1.14	ND	0.02	ND	0.03	ND	ND	ND	0.02	ND	ND	6.76	ND	0.01	7.98	
LH										0.2						
M20	3.41	0.05	0.55	0.57	0.06	0.16	0.09	0.25	ND	5	ND	12.60	0.01	ND	18.0	
LH										3.2						
M21	ND	0.55	2.69	2.27	1.41	5.51	2.26	1.69	1.07	8	0.17	1.68	0.15	1.60	24.3	
LH										4.2						
M22	0.11	0.02	0.11	1.90	ND	0.56	0.65	1.10	0.73	9	0.31	9.77	2.02	6.14	27.7	
LH										0.0						
M23	14.9	0.36	8.49	ND	0.01	ND	ND	0.01	0.01	2	ND	ND	ND	ND	23.8	
LH										0.1						
M24	2.65	0.12	ND	ND	0.16	ND	ND	3.00	ND	3	ND	ND	ND	ND	6.06	
LH										8.7						
M25	4.82	0.24	ND	ND	ND	ND	ND	ND	7.98	1	ND	ND	ND	ND	21.8	
LH										1.0						
M26	4.63	2.39	0.44	4.09	0.94	1.46	3.95	5.83	4.98	2	0.82	6.56	0.22	1.19	38.5	
LH										0.0						
M27	4.13	0.67	0.13	0.85	0.11	0.45	0.09	2.53	ND	6	0.98	4.53	0.03	1.31	15.9	
LH																
M28	0.10	0.05	0.15	ND	0.21	0.09	1.53	2.16	2.02	ND	0.22	3.87	5.17	1.03	16.6	
LH										1.4						
M29	2.48	0.57	0.85	0.53	0.40	0.23	0.35	0.24	0.85	2	0.06	ND	0.38	0.04	8.40	
LH										2.0						
M30	0.82	2.79	2.19	0.89	3.20	1.23	3.77	1.08	0.16	3	ND	0.03	0.92	ND	19.1	
LH	4.21	ND	0.59	0.03	0.65	0.49	0.02	ND	0.08	0.0	ND	0.44	0.18	0.54	7.27	

CH											0.2					
M2	2.71	ND	1.85	ND	1.14	ND	ND	ND	ND	ND	3	ND	ND	ND	ND	5.93
CH																
M3	2.57	ND	ND	0.05	0.02	ND	0.16	ND	0.03	ND	0.06	0.07	ND	ND	2.96	
CH											0.6					
M4	3.90	11.33	0.72	0.06	ND	ND	ND	0.16	ND	2	0.36	0.03	0.12	0.78	18.1	

Supplementary Table 3. Estimated daily intake of OPPs in the herbal mixtures

		Children	Adults
Liquid	LHM1	0.37	0.28
	LHM2	0.34	0.26
	LHM3	0.60	0.45
	LHM4	0.23	0.17
	LHM5	0.42	0.31
	LHM6	0.35	0.26
	LHM7	0.55	0.41
	LHM8	0.59	0.45
	LHM9	0.80	0.60
	LHM10	0.36	0.27
	LHM11	0.22	0.17
	LHM12	0.21	0.15
	LHM13	0.23	0.17
	LHM14	0.33	0.25
	LHM15	0.16	0.12
	LHM16	0.36	0.27
	LHM17	0.48	0.36
	LHM18	0.27	0.20
	LHM19	0.13	0.10
	LHM20	0.30	0.23
	LHM21	0.41	0.30
	LHM22	0.46	0.35
	LHM23	0.40	0.30
	LHM24	0.10	0.08
	LHM25	0.36	0.27
	LHM26	0.64	0.48
	LHM27	0.26	0.20
	LHM28	0.28	0.21
	LHM29	0.14	0.11
	LHM30	0.32	0.24
	LHM31	0.12	0.09
	LHM32	0.06	0.05
	LHM33	0.06	0.05
	LHM34	0.10	0.07
	LHM35	0.16	0.12
Powdered	PHM1	0.23	0.17
	PHM2	0.33	0.25
	PHM3	0.33	0.24
	PHM4	0.20	0.15
	PHM5	0.08	0.06
	PHM6	0.19	0.14
	PHM7	0.50	0.38
	PHM8	0.37	0.27
	PHM9	0.28	0.21

	PHM10	0.15	0.11
	PHM11	0.86	0.64
Capsulated	CHM1	0.12	0.09
	CHM2	0.10	0.07
	CHM3	0.05	0.04
	CHM4	0.30	0.23

Supplementary Table 4. Hazard index of OPPs in herbal mixtures for adults' exposure

		Diazinone	Chloropyrifos-methyl	Pirimiphos Methyl	Quinalphos	Chlorpyrifos	EPN	HI
Liquid	LHM 1	2.40E-05	1.52E-06	1.05E-04	8.05E-05	0.00E+00	0.00E+00	2.11E-04
	LHM 2	6.16E-06	3.36E-06	3.99E-05	1.68E-05	1.49E-05	2.80E-03	2.89E-03
	LHM 3	2.19E-05	7.43E-06	2.61E-05	2.09E-05	4.05E-05	3.42E-03	3.53E-03
	LHM 4	1.05E-04	4.79E-08	1.31E-05	0.00E+00	3.00E-06	9.71E-04	1.09E-03
	LHM 5	2.07E-05	5.72E-06	4.14E-05	3.52E-05	1.75E-05	1.91E-03	2.03E-03
	LHM 6	2.91E-05	2.58E-06	2.32E-05	4.03E-05	3.40E-05	8.51E-04	9.80E-04
	LHM 7	5.17E-05	1.63E-06	7.27E-05	1.77E-05	1.34E-05	2.10E-03	2.25E-03
	LHM 8	8.32E-05	1.05E-05	7.73E-05	9.01E-05	2.96E-05	1.63E-03	1.92E-03
	LHM 9	6.95E-05	1.27E-05	7.06E-05	9.18E-05	1.51E-05	3.14E-03	3.40E-03
	LHM 10	1.75E-05	3.18E-06	2.94E-05	7.79E-05	1.01E-05	0.00E+00	1.38E-04
	LHM 11	9.90E-05	2.72E-06	4.27E-06	1.41E-05	0.00E+00	1.20E-05	1.32E-04
	LHM 12	7.96E-05	3.73E-06	3.78E-06	1.20E-06	2.40E-07	4.91E-04	5.80E-04
	LHM 13	5.51E-05	9.36E-06	4.27E-06	6.23E-06	2.40E-07	0.00E+00	7.52E-05
	LHM 14	2.21E-04	5.05E-06	5.42E-06	8.63E-06	0.00E+00	7.79E-04	1.02E-03
	LHM 15	4.86E-05	4.26E-06	4.60E-06	5.75E-06	0.00E+00	0.00E+00	6.32E-05
	LHM 16	1.71E-05	9.31E-06	3.61E-06	6.47E-06	2.10E-05	1.92E-03	1.98E-03
	LHM 17	8.08E-05	3.96E-06	2.13E-06	1.68E-06	0.00E+00	2.45E-03	2.55E-03
	LHM 18	1.78E-05	0.00E+00	1.28E-06	1.92E-06	1.28E-05	4.54E-03	4.59E-03
	LHM 19	1.95E-05	2.40E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-05
	LHM 20	5.84E-05	6.59E-07	9.36E-06	2.16E-06	3.00E-06	3.00E-04	3.73E-04
	LHM 21	0.00E+00	3.22E-06	3.73E-06	5.42E-05	2.03E-05	3.93E-03	4.05E-03

	LHM	1.88E-		3.12E-			5.14E-	5.20E
	22	06	1.32E-07	05	1.56E-05	1.32E-05	03	-03
	LHM	2.55E-		0.00E+0	0.00E+0		2.40E-	2.89E
	23	04	1.02E-05	0	0	1.20E-07	05	-04
	LHM	4.54E-		0.00E+0	0.00E+0		1.56E-	2.37E
	24	05	0.00E+00	0	0	3.60E-05	04	-04
	LHM	8.25E-		0.00E+0	0.00E+0		1.04E-	1.05E
	25	05	0.00E+00	0	0	0.00E+00	02	-02
	LHM	7.93E-		6.72E-			1.22E-	1.53E
	26	05	5.27E-07	05	9.47E-05	6.99E-05	03	-03
	LHM	7.07E-		1.40E-			7.19E-	1.89E
	27	05	1.56E-07	05	2.16E-06	3.03E-05	05	-04
	LHM	1.71E-		0.00E+0			0.00E+	6.45E
	28	06	1.80E-07	0	3.67E-05	2.59E-05	00	-05
	LHM	4.25E-		8.70E-			1.70E-	1.77E
	29	05	1.02E-06	06	8.39E-06	2.88E-06	03	-03
	LHM	1.40E-		1.46E-			2.43E-	2.57E
	30	05	2.63E-06	05	9.04E-05	1.29E-05	03	-03
	LHM	7.21E-		4.93E-			4.79E-	1.22E
	31	05	7.07E-07	07	4.79E-07	0.00E+00	05	-04
	LHM	3.90E-		4.93E-	0.00E+0		2.76E-	3.15E
	32	05	1.20E-08	07	0	0.00E+00	04	-04
	LHM	0.00E+		9.85E-			7.19E-	7.26E
	33	00	1.59E-06	07	4.08E-06	0.00E+00	04	-04
	LHM	2.65E-		5.25E-			5.75E-	6.13E
	34	05	1.08E-07	06	2.16E-06	3.24E-06	04	-04
	LHM	3.01E-		0.00E+0	0.00E+0		0.00E+	3.60E
	35	05	5.91E-06	0	0	0.00E+00	00	-05
Powder	PHM	9.50E-		5.09E-			0.00E+	2.13E
ed	1	05	0.00E+00	05	6.69E-05	0.00E+00	00	-04
	PHM	1.53E-		4.76E-			1.34E-	1.51E
	2	04	3.25E-06	06	8.39E-06	0.00E+00	03	-03
	PHM	1.20E-		1.44E-			0.00E+	1.44E
	3	04	8.26E-06	05	4.79E-07	1.20E-07	00	-04
	PHM	0.00E+		2.13E-			0.00E+	2.50E
	4	00	2.97E-06	06	3.12E-06	1.68E-05	00	-05
	PHM	4.02E-		0.00E+0	0.00E+0		0.00E+	4.08E
	5	05	5.27E-07	0	0	0.00E+00	00	-05
	PHM	2.36E-		2.10E-	0.00E+0		4.79E-	5.30E
	6	05	5.81E-06	05	0	0.00E+00	04	-04
	PHM	3.14E-		3.45E-	0.00E+0		8.15E-	1.15E
	7	04	2.52E-06	06	0	1.32E-05	04	-03
	PHM	3.77E-		1.84E-	0.00E+0		3.60E-	6.40E
	8	06	2.88E-07	05	0	5.63E-06	05	-05
	PHM	0.00E+		0.00E+0			0.00E+	1.60E
	9	00	3.97E-06	0	1.56E-04	3.60E-07	00	-04

	PHM	0.00E+		0.00E+0	0.00E+0		0.00E+	3.87E
	10	00	2.42E-06	0	0	3.63E-05	00	-05
	PHM	5.26E-		3.00E-	0.00E+0		1.59E-	1.62E
	11	05	0.00E+00	04	0	1.20E-07	02	-02
Capsula ted	CHM	8.30E-		1.61E-	0.00E+0		0.00E+	9.91E
	1	05	0.00E+00	05	0	0.00E+00	00	-05
	CHM	4.64E-		0.00E+0	0.00E+0		2.76E-	3.24E
	2	05	2.22E-06	0	0	0.00E+00	04	-04
	CHM	4.40E-		8.21E-			0.00E+	4.87E
	3	05	0.00E+00	07	3.84E-06	0.00E+00	00	-05
	CHM	6.68E-		9.85E-	0.00E+0		7.43E-	8.14E
	4	05	8.63E-07	07	0	1.92E-06	04	-04

Supplementary Table 5. Hazard index of OPPs in herbal mixtures for children exposure

		Diazino	Chloropyrip	Pirimip	Quinalp	Chlorpyr	EPN	HI
		ne	hos-methyl	hos	hos	ifos		
				Methyl				
Liquid	LHM	3.20E-		1.40E-			0.00E+	2.82E
	1	05	2.03E-06	04	1.07E-04	0.00E+00	00	-04
	LHM	8.22E-		5.32E-			3.74E-	3.85E
	2	06	4.47E-06	05	2.24E-05	1.98E-05	03	-03
	LHM	2.92E-		3.48E-			4.55E-	4.71E
	3	05	9.91E-06	05	2.78E-05	5.40E-05	03	-03
	LHM	1.40E-		1.75E-			1.29E-	1.46E
	4	04	6.39E-08	05	0	4.00E-06	03	-03
	LHM	2.76E-		5.52E-			2.54E-	2.70E
	5	05	7.62E-06	05	4.70E-05	2.33E-05	03	-03
	LHM	3.88E-		3.09E-			1.13E-	1.31E
	6	05	3.44E-06	05	5.37E-05	4.54E-05	03	-03
	LHM	6.89E-		9.70E-			2.80E-	3.01E
	7	05	2.17E-06	05	2.37E-05	1.79E-05	03	-03
	LHM	1.11E-		1.03E-			2.17E-	2.56E
	8	04	1.40E-05	04	1.20E-04	3.95E-05	03	-03
	LHM	9.27E-		9.41E-			4.19E-	4.53E
	9	05	1.70E-05	05	1.22E-04	2.01E-05	03	-03
	LHM	2.33E-		3.92E-			0.00E+	1.84E
	10	05	4.24E-06	05	1.04E-04	1.34E-05	00	-04
	LHM	1.32E-		5.69E-			1.60E-	1.76E
11	04	3.63E-06	06	1.89E-05	0.00E+00	05	-04	
LHM	1.06E-		5.04E-			6.55E-	7.73E	
12	04	4.97E-06	06	1.60E-06	3.20E-07	04	-04	
LHM	7.35E-		5.69E-			0.00E+	1.00E	
13	05	1.25E-05	06	8.31E-06	3.20E-07	00	-04	
LHM	2.94E-		7.22E-			1.04E-	1.36E	
14	04	6.73E-06	06	1.15E-05	0.00E+00	03	-03	
LHM	6.48E-		6.13E-			0.00E+	8.43E	
15	05	5.67E-06	06	7.67E-06	0.00E+00	00	-05	
LHM	2.28E-		4.82E-			2.56E-	2.63E	
16	05	1.24E-05	06	8.63E-06	2.80E-05	03	-03	
LHM	1.08E-		2.85E-			3.26E-	3.40E	
17	04	5.27E-06	05	2.24E-06	0.00E+00	03	-03	
LHM	2.37E-		1.71E-			6.06E-	6.12E	
18	05	0.00E+00	05	2.56E-06	1.71E-05	03	-03	
LHM	2.60E-		0.00E+0			0.00E+	2.61E	
19	05	3.20E-08	0	0	0.00E+00	00	-05	
LHM	7.79E-		1.25E-			4.00E-	4.98E	
20	05	8.79E-07	05	2.88E-06	4.00E-06	04	-04	
LHM	0.00E+		4.97E-			5.24E-	5.40E	
21	00	4.30E-06	05	7.22E-05	2.70E-05	03	-03	

	LHM	2.51E-		4.16E-			6.86E-	6.94E
	22	06	1.76E-07	05	2.08E-05	1.76E-05	03	-03
	LHM	3.40E-		0.00E+0	0.00E+0		3.20E-	3.86E
	23	04	1.36E-05	0	0	1.60E-07	05	-04
	LHM	6.05E-		0.00E+0	0.00E+0		2.08E-	3.16E
	24	05	0.00E+00	0	0	4.79E-05	04	-04
	LHM	1.10E-		0.00E+0	0.00E+0		1.39E-	1.40E
	25	04	0.00E+00	0	0	0.00E+00	02	-02
	LHM	1.06E-		8.95E-			1.63E-	2.05E
	26	04	7.03E-07	05	1.26E-04	9.32E-05	03	-03
	LHM	9.43E-		1.86E-			9.59E-	2.52E
	27	05	2.08E-07	05	2.88E-06	4.04E-05	05	-04
	LHM	2.28E-		0.00E+0			0.00E+	8.59E
	28	06	2.40E-07	0	4.89E-05	3.45E-05	00	-05
	LHM	5.66E-		1.16E-			2.27E-	2.35E
	29	05	1.36E-06	05	1.12E-05	3.84E-06	03	-03
	LHM	1.87E-		1.95E-			3.24E-	3.42E
	30	05	3.50E-06	05	1.21E-04	1.73E-05	03	-03
	LHM	9.61E-		6.57E-			6.39E-	1.62E
	31	05	9.43E-07	07	6.39E-07	0.00E+00	05	-04
	LHM	5.21E-		6.57E-	0.00E+0		3.68E-	4.20E
	32	05	1.60E-08	07	0	0.00E+00	04	-04
	LHM	0.00E+		1.31E-			9.59E-	9.68E
	33	00	2.13E-06	06	5.43E-06	0.00E+00	04	-04
	LHM	3.54E-		7.01E-			7.67E-	8.17E
	34	05	1.44E-07	06	2.88E-06	4.32E-06	04	-04
	LHM	4.02E-		0.00E+0	0.00E+0		0.00E+	4.81E
	35	05	7.88E-06	0	0	0.00E+00	00	-05
Powder ed	PHM	1.27E-		6.79E-			0.00E+	2.84E
	1	04	0.00E+00	05	8.92E-05	0.00E+00	00	-04
	PHM	2.05E-		6.35E-			1.79E-	2.02E
	2	04	4.33E-06	06	1.12E-05	0.00E+00	03	-03
	PHM	1.60E-		1.93E-			0.00E+	1.91E
	3	04	1.10E-05	05	6.39E-07	1.60E-07	00	-04
	PHM	0.00E+		2.85E-			0.00E+	3.33E
	4	00	3.96E-06	06	4.16E-06	2.24E-05	00	-05
	PHM	5.37E-		0.00E+0	0.00E+0		0.00E+	5.44E
5	05	7.03E-07	0	0	0.00E+00	00	-05	
PHM	3.15E-		2.80E-	0.00E+0		6.39E-	7.07E	
6	05	7.75E-06	05	0	0.00E+00	04	-04	
PHM	4.18E-		4.60E-	0.00E+0		1.09E-	1.53E	
7	04	3.36E-06	06	0	1.76E-05	03	-03	
PHM	5.02E-		2.45E-	0.00E+0		4.79E-	8.54E	
8	06	3.84E-07	05	0	7.51E-06	05	-05	
PHM	0.00E+		0.00E+0			0.00E+	2.14E	
9	00	5.29E-06	0	2.08E-04	4.79E-07	00	-04	

	PHM	0.00E+		0.00E+0	0.00E+0		0.00E+	5.17E
	10	00	3.23E-06	0	0	4.84E-05	00	-05
	PHM	7.01E-		4.00E-	0.00E+0		2.12E-	2.16E
	11	05	0.00E+00	04	0	1.60E-07	02	-02
Capsula	CHM	1.11E-		2.15E-	0.00E+0		0.00E+	1.32E
ted	1	04	0.00E+00	05	0	0.00E+00	00	-04
	CHM	6.19E-		0.00E+0	0.00E+0		3.68E-	4.32E
	2	05	2.96E-06	0	0	0.00E+00	04	-04
	CHM	5.87E-		1.09E-			0.00E+	6.49E
	3	05	0.00E+00	06	5.11E-06	0.00E+00	00	-05
	CHM	8.90E-		1.31E-	0.00E+0		9.91E-	1.08E
	4	05	1.15E-06	06	0	2.56E-06	04	-03