University of Montenegro Biotechnical faculty





Surveillance of invasive and native mosquito vectors and pathogens they transmit in Montenegro

SurveilLance of invasive and native mOsquito VeCtors and pathogENs they transmit in Montenegro – LOVCEN

LOVCEN WP1

(WP1) <u>Collaborative research on native/invasive mosquitoes and pathogens they transmit</u> in Montenegro and development of non-chemical control measures

(WP1a) - Surveillance of invasive and native mosquito

(<u>WP1b</u>) - Mobile phone application for surveillance of invasive and indigenous species (KOMARAC)

(WP1c) – Detection of pathogens in mosquitoes and humans

(WP1d) – Social Impact and Policy Recommendation

(WP1e) - SIT and other non-chemical control methods

(WP1f) Climate change impact on MV and MBD, adaptation and mitigation

(WP1a) - Surveillance of invasive and native mosquito 2015

			Hi	storical data	New data
No	Species		Scientist	Locality	Locality
1	Aedes zammitti		Božičić	Bar	Jaz
2	Aedes vexans	Rift Valley and Celovo Virus			Radovici
3	Aedes echinus				
4	Aedes geniculata		Božičić	Ulcinj, Sutomore, Petrovac, Šavnik, Žabljak	Tolosi - Podgorica, Zeta
5	Aedes annulipes		Božičić	Žabljak	
6	Aedes caspius	Rift Valley Virus and D. immitis and D. repens			Radovici, Zlatica PG, Solana UL, Donji Stoj, Kneta, Lastva Grbaljska, Jaz
7	Aedes cataphylla		Božičić	Žabljak	
8	Aedes communis		Božičić	Žabljak	
9	Aedes detritus		Božičić	Ulcinj	
10	Aedes pionips		Božičić	Žabljak	
11	Aedes pulcritarsis		Božičić	Herceg Novi	
12	Aedes pullatus		Bozicic	Zabljak	
13	Aedes punctor		Bozicic	Zabljak ×	
14	Aedes rusticus		Božičić	Zabljak	Donji Stoj, Ada Bojana, Lastva Grbaljska
15	Aedes sticticus				
16	Aedes albopictus	Chicungunia, Dengue, D. immitis and D. repens			svo primorije, centralni dio, Pljevlja, Mojkovac, Kolasin
17	Anopheles atroparvus		Vitanović	Rijeka Crnojevića	
18	Anopheles claviger		Apfellbeck	Herceg Novi	
19	Anopheles hyrcanus		Božičić	Zabljak	
			Bozicic	Savnik, R. Crnojevica	
20	A second state of the seco		Apfellbeck	Kotor, Livat	7.4.
20	Anopheles maculipennis s.s.		Vujosevic	R. Crnojevica, Virpazar	<u> </u>
			Di Lucca et al	Skadarsko jezero, Bijelo Polje	
			-	Kotor, Skadarsko jezero, Bijelo	
21	Anopheles melanoon		Di Lucca et al	Polje	
			Di Lucca et al	Kotor, Skadarsko jezero	
22	Anopheles messeae		Vitanović	Rijeka Crnojevića, Ulcinj	
			Vujošević	Virpazar i Malo Blato	
23	Anopheles plumbeus	vector of malaria			Spuz, Solana, Ada Bojana, Kneta, Donji Stoj i Lastva Grbaljska
			Vitanović	R. Crnojevića, Ulcinj	
24	Anopheles saccharovi		Apfellbeck	Hercg Novi, Tivat	Solana Ulcinj
			Vujošević	R. Crnojevića, Virpazar	
25	Anopheles superpictus		Apfellbeck	Kotor, Tivat, H. Novi	
	·····		Vujošević	Virpazar i R. Crnojevića	
26	Coquillettidia richiardii		Božičić	Ulcinj	Zeta, Spuz, Rijeka Crnojevica, Utjeha, Solana, Donji Stoj, Kneta, Ada Bojana, Jaz

(WP1a) - Surveillance of invasive and native mosquito 2015

			Histor	rical data	New data		
No	Species		Scientist	Locality	Locality		
27	Coquillettidia buxtoni				Rijeka Crnojevica, Solana, Donji Stoj, Kneta, Ada Bojana, Jaz		
28	Culex hortensis		Božičić	Žabljak, Šavnik, Ulcinj			
29	Culex modestus	West Nile Virus, D. immitis and D. repens					
30	Culex pipiens		Božičić	Žabljak, Šavnik, Tivat	Tolosi, Stara Varos, Mataguyi, Gornja Gorica, Donja Gorica, Zlatica, Donji Bandici, Centar, Preko Morace, Zeta, Spuz, Rijeka Crnojevica, Cetinje - Bajice, Bar - Stara Maslina, Solana, Donji Stoj, Kneta, Ada Bojana, Lastva Grbaljska, Jaz		
31	Culex territans		Božičić	Žabljak			
32	Culex theileri		Božičić	Ulcinj			
33	Culiseta longiareolata		Božičić	Savnik, Zabljak	Gornja Gorica - PG		
34	Culiseta annulata Culiseta morsitans		BOZICIC	Zabijak	Spuz, Jaz		
- 55	Cuiseta morsitans	120 140	15° 16° 17°	18° 10° 20°	21° 22° 23°		
http	Historical records of <i>Ae. annulipes</i> in Montenegro and so countries of South-E Europe	of ome ast		Aedes annulip	e Basiliè Cangetter Tryis Townig T		

- 21st June 2nd July
- Cooperation with VectorNet.

datum	postavljanje klopki	spavanje
22 jun	Pluzine	Pluzine
23 jun	Savnik/Zabljak	Zabljak
24 jun	Pljevlja	Pljevlja
25 jun	Bijelo Polje	Bijelo Polje
26 jun	Podgorica	dry ice
27 jun	Kolasin/Mojkovac	Kolasin
28 jun	Andrijevica/Plav/Gusinje	Berane
29 jun	Andrijevica/ Berane	Berane
30 jun	Berane	Berane
1 jul	Rozaje	Rozaje

start

end

(WP1a) - Surveillance of invasive and native mosquito

PATENT - Mosquito resting trap - ZBUN TiN - MNE



(<u>WP1b</u>) - Mobile phone application for surveillance of invasive and indigenous species (KOMARAC)



(WP1c) – Detection of pathogens in mosquitoes and humans

http://project-lovcen.me

Date	Sample	Place	Specie	N°	Cod.Pool	Molecular reseach*	Date of analysis	
05-06.07.2014	1/1	Tolosi 2	Cx.pipiens	5	5 M1	negative to all	7/23/2013	
05-06.07.2014	1/2	Tolosi 2	Ades spp.		1 M2	negative to all	7/23/2013	
05-06.07.2014	2	Stara Varos	Cx.pipiens	3	3 M3	negative to all	7/23/2013	2014
06-07.07.2014	3	Mataguzi	Cx.pipiens	4	4 M4	negative to all	7/23/2013	2014
06-07.07.2014	4/1	Gornja Gorica	Cs.longiarolata		1 M5	negative to all	7/23/2013	
06-07.07.2014	4/2	Gornja Gorica	Cx.pipiens	(5 M6	negative to all	7/23/2013	
06-07.07.2014	4/3	Gornja Gorica	Culex spp.		1 M7	negative to all	7/23/2013	
07-08.07.2014	5	Tolosi 1	Cx.pipiens	Ę	5 M8	negative to all	7/23/2013	
08-09.07.2014	6	Donja Gorica	Cx.pipiens	2	2 M9	negative to all	7/23/2013	
08-09.07.2014	7/1	Zlatica	Oc. Caspius		1 M10	negative to all	7/23/2013	
08-09.07.2014	7/2	Zlatica	Cx.pipiens	1() M11	negative to all	7/23/2013	
08-09.07.2014	7/3	Zlatica	Culex spp.	2	2 M12	negative to all	7/23/2013	
09-10.07.2014	8/1	Donji Bandici	Cx.pipiens		1 M13	negative to all	7/23/2013	
09-10.07.2014	8/2	Donji Bandici	Culex spp.		1 M14	negative to all	7/23/2013	
09-10.07.2014	9	Gornji Bandici	Culex spp.		1 M15	negative to all	7/23/2013	
10-11.07.2014	10	Centar	Cx.pipiens	2	2 M16	negative to all	7/23/2013	
10-11.07.2014	11	Preko Morace	Cx.pipiens		1 M17	negative to all	7/23/2013	

* Pan-flavivirus, Pan-bunyavirus, Pan-phlebovirus, Pan-alphavirus, West Nile and USUTU viruses $17\ samples$

48 saples of the human sera, found negative, were tested on anti WN, IgM and							
IgG antibodies							
Borrelia burgdorferi	840 IgG ELISA tests	59 positive					
Borrelia burgdorferi	838 IgM ELISA tests	79 positive					
Borrelia burgdorferi	76 Real-Time PCR tests	all negative					
Leishmania spp.	22 microscopy	all negative					
Leishmania donovani	143 IgG ELISA tests	10 positive					
Plasmodium spp.	14 microscopy	all negative					
Lyme boreliosis		6 reports of disease					
Leishmaniasis	1000 complex	3 reports of disease					
Infectio West Nile	Taan samples	no registered cases					
Malaria		no registered cases					



(WP1c) – Detection of pathogens in mosquitoes and humans

	Samples 2015	Flavivirus, Bunyavir	us, Alpha	avirus ,	Phlebovirus (viral genus l	PCRs),	West	Nile , USUT	U (specific Rea	I Time PCR	s)
No	locality	GPS	date	trap	species	sex	no.	dry ace	Cod. POOL	darwin	camp.
3			17.05.		Culex pipiens	ž	4	yes	M1	197163	1
5	Mataguži	42.321792, 19.283035	17.05.	BG	Culex pipiens	ž	10	yes	M2	197163	2
10	Lug - Jasen dalje od kucice		17.05.	NS2	Culex pipiens	ž	2	yes	M3	197163	3
14	Lug- pokošena livada		17.05.	NS2	Culex pipiens	ž	3	yes	M4	197163	4
18	Lug - kod kućice		17.05.	NS2	Culex pipiens	ž	1	yes	M5	197163	5
22	Anđušići pored BG	42.333503, 19.241560	17.05.	NS2	Culex pipiens	ž	2	yes	M6	197163	6
26	Anđušići u bagrenju	42.333571, 19.242351	17.05.	NS2	Culex pipiens	ž	9	yes	M7	197163	7
64	Cetinje Bajice	42.400572, 18.897384	19.05.	NS2	Culex pipiens	ž	1	yes	M8	197163	8
66					Culex pipiens	ž	3	yes	M9	197163	9
69	Bar - Stara maslina	42.080208, 19.130197	20.05.	NS2	Culex pipiens	ž	1	yes	M10	197163	10
73	Solana Ulcinj	41.917927, 19.249858	20.05.	NS2	Culex pipiens	ž	50	yes	M11	197163	11
83					Coquillettidia buxtoni	ž	50	yes	M12	197163	12
84					Coquillettidia buxtoni	ž	1	yes	M13	197163	13
85					Culex pipiens	ž	14	yes	M14	197163	14
86					Coquillettidia buxtoni	ž	33	yes	M15	197163	15
92					Coquillettidia buxtoni	ž	50	yes	M16	197163	16
94	Lastva 1 tresnja	42.306016, 18.794303	21.05.	NS2	Culex pipiens	ž	1	yes	M17	197163	17
99					Culex pipiens	ž	5	yes	M18	197163	18
102					Coquillettidia buxtoni	ž	1	yes	M19	197163	19
107	Jaz 8 kod prve prodaje	42.284273, 18.804771	21.05.	NS2	Culex pipiens	ž	2	yes	M20	197163	20
109	Lastva Grbaljska 3	42.306130, 18.794827	21.05.	NS2	Culex pipiens	ž	5		M21	197163	21
112	Jaz 7 Dule pored kafane	42.282032, 18.801440	21.05.	NS2	Culex pipiens	ž	15	yes	M22	197163	22
115					Coquillettidia buxtoni	ž	1	yes	M23	197163	23
117	Jaz 4 u trsci	42.281555, 18.800195	21.05.	NS2	Culex pipiens	ž	25	yes	M24	197163	24
119					Coquillettidia buxtoni	ž	53	yes	M25	197163	25
122					Coquillettidia buxtoni	ž	2	yes	M26	197163	26
125	Kneta	41.905308, 19.310662	20.05.	NS2	Cx. pusillus	ž	22	yes	M27	197163	27
126					Culex pipiens	ž	26	yes	M28	197163	28
	M1 and M9 are with positive	reaction only for Bunyaviru	ıs , but w	vith "no	ot specific" results		392	speciment	s	samples	28

(WP1d) – Social Impact and Policy Recommendation





The necessity of a mosquito control system





SHARES OF FINANCIAL SUPPORT FOR THE NATIONAL MONITORING AND



2014







Assessment of risk for Chikungunya, Dengue and Zika Outbreak in Montenegro

2015



Tivat - 73.57 ha



Lastva Grbaljska - 30.21 ha

Radovici - 20.73 ha

Objectives:

- evaluation of *Ae.albopictus* population density in 3 urban areas

- correlation between OT and HLC data
- estimation the risk of outbreak in case of introduction by viremic travelers;
- comparison the observed level of correlations between OT and HLC data Montenegro Northern Italy;
- comparison of Chikungunya, Dengue outbreak risk in Montenegro and in Northern Italy.

Results:

The *Ae. albopictus* population density may support outbreak of Chikungunya A226V, Chikungunya and Dengue viruses.

A preliminary estimation indicates that also Zika virus may be able to produce outbreak in case of introduction.

Assessment of risk for Chikungunya, Dengue and Zika Outbreak in Montenegro





(<u>WP1f</u>) Climate change impact on MV and MBD, adaptation and mitigation



Deviation of air temperature And precipitation during vegetation period (April-September) in respect to 1981-2010 referent period - for 2001-2030 - for 2031-2060

- for 2071-2100

(<u>WP1f</u>) Climate change impact on MV and MBD, adaptation and mitigation



Climatic conditions vs establishment of *Aedes albopictus* for Montenegro period 1981-2010



LOVCEN WP2

(WP2) Twinning through exchange of know-how and experience and dissemination activities

- (WP2a) Training visits of MCM's young researchers to international partner institutions
- (WP2b) Know-how visits of MCM's researchers to international partner institutions
- (WP2c) Hosting foreign institutions representatives for in situ training
- (WP2d) Active participation of the applicant's research staff at international conferences
- (WP2e) Introduction of teaching on MV and MBD
- (WP2f) Designing LOVCEN web site
- (WP2g) Internal dissemination meetings
- (WP2h) Preparing web pages and brochures
- (WP2i) "Laboratory open days"
- (WP2j) Public (radio, TV, newspapers) appearances
- (WP2k) Dissemination and feedback on stakeholders opinions
- (WP2I) Community participation in mosquito surveillance and control

Kick off meeting 02-04. June2014. - 4 international partners organization representatives

(WP2a) – Training visits of MCM's young researchers to international partner institutions

2 mobilities of 2 persons; 1 trainer

(WP2b) - Know-how visits of MCM's researchers to international partner institutions

4 mobilities of 6 persons; 3 trainers

(<u>WP2c</u>) – Hosting foreign institutions representatives for *in situ* training

11 mobilities of 8 persons

1st Annual meeting 13-15. May 2015 - 7 international partners organization representatives

First training course of medical entomology working group (MediLabSecure). FoA, Novi Sad, Serbia, 8-12 June 2015. – 2 young researchers attend the training

2nd Annual meeting 10-13. May 2016 - 5 international partners organization representatives

(<u>WP2d</u>) – Active participation of the applicant's research staff at international conferences

Multi Country - Workshop on the implementation of mosquito vectors surveillance in the EU and enlargement countries; INT MARKT 56605, *Brussels* 04 - 05 December 2014

2 persons attended conference

2014

Preventing Vector Borne Diseases around the Mediterranean and Black Sea regions by creating new networks, **MediLabSecure first "Head of Laboratory" meeting Institut Pasteur, Paris,** 14 - 15 January 2015

3 persons attended meeting



(<u>WP2d</u>) – Active participation of the applicant's research staff at international conferences

3rd scientific meeting with international participation - 5. June – World environment day 04th – 05th June 2015, Bihac, Bosnia and Hercegovina **2 persons attended conference** 2015

12th BiH Plant Protection Symposium
03rd – 05th November 2015, Mostar,
Bosnia and Hercegovina
1 person attended conference

Preventing Vector Borne Diseases around the Mediterranean and Black Sea regions by creating new networks, WORKSHOP AT PASTEUR INSTITUTE Institut Pasteur, Paris, 14 - 17 December 2015 6 persons attended meeting



2nd VectorNet Annual General Meeting, Antwerp, Belgium, as an vectors specialist and contributor in VectorNet activities LOVCEN Project Leader was personally invited to attend AGM **2 persons attended conference**

(WP2e) – Introduction of teaching on MV and MBD completed for academic year 2014/2015.

NEW UERSION

Čifeo prodmoto	Status predmeta	Semestar	Broj ECTS kredita	Fond časova
291108133	Obayezni	11	3	2P + 1L
271100155	Contraction			
Studijski program za k	coje se organizuje: Specijal	ističke akademske stu	idije Poljoprivrede. Studijski p	rogram Biljna proizvodnja,
smjer Zaštita bilja (stu	udije traju 2 semestara, 60	ECTS kredita, nakor	završenih osnovnih studija u	i trajanju od 3 godine i 180
ECTS kredita)				
Uslovljenost drugim pi	redmetima: Nema uslovlje	nosti za prijavljivanje	i slušanje predmeta	m ekologijom odnosima sa
Ciljevi izučavanja pre	dmeta: Cilj nastave je da	se studenti upoznaju	6toparazitnih nematoda i si	motoma ostećenia koja one
vektorima i sistematiko	sm nematoda; saviadaju vj	načinu i vremenu suz	bijanja.	
stvaraju, da bi se ospose	ika i saradnika: Dr lgor Pa	iović		
Metod nastave i savlad	dania gradiva: Predavanja,	vježbe, seminarski ra	d, konsultacije, kolokvijumi i	završni ispit.
		SADRŽAJ PREDM	AETA:	
Pripremne nedelje	Priprema i upis str	udenata		
I nedelja	Uvod u nematolog	aiju, klasifikacija i sis	tematizovanje nematoda	
II nedelja	Morfologija i anat	lomija nematoda	1.1 Ph	m anteganieti namotofagi
III nedelja	Odnos nematoda	i ostalih živih bić	a (parazitizam, fitoparazitiza	m, antagonisti, nematoragi,
	predatori, vektori	virusa); Odnos sa v	extorima; Ekologija liematoda	ih nematoda
IV nedelja	Karakteristike naj	bitnijih grupa, redovi	i, familija i rodova intoparaziti	in nematoria
V nedelja	Tehnike rada sa n	ematodama		
VI nedelja	Kolokvijum I			
VII nedelja	Stobodna neucija Namatode u voća	rstvu i vinogradarstvi	1	
VIII nedelja	Nematode u ratar	styn		
X nedelja	Nematode kromp	ira		
XI nedelia	Nematode u povr	tarstvu		
XII nedelia	Nematode u obje	ktima zaštićenog pros	tora	
XIII nedelia	Kolokvijum II			
XIV nedelja	Nematode duvan	a, ukrasnih i šumskih	biljaka	
XV nedelja	Mogućnosti suzb	ijanja fitoparazitnih r	ematode	
XVI nedelja	Završni ispit			
Završna nedelja	Ovjera semestra i	upis ocjena	1.	
XVIII-XXI nedelja	Dopunska nastav	a i popravni ispitni re	DMETU	
	OPTERECENJE STU	DENATA PO PRE	DMLTU:	
Nei	delino:	<u>c</u>	toku senrestru.	
3 kredita 40	/30= 4 sata	Nastava i završni	spit: 4sata x 10 = 04 sata	dministracija, upis, ovjera)
Struktura:		Neophodne pripre	me prije pocetka semestra (anning and a species of the species
2 sata predi	avanja	Likunno onterećer	ie za predmet: 3 x 30 = 90 sa	ti
1 sat vjezo	ividualnog rada studenata	Dopunski rad: za	pripremu ispita u popravno	m ispitnom roku, uključujuć
(nrinreme za viežbe.	izrada seminarskog rada)	polaganje popravno	og ispita od 0 - 18 sati	
ukliučujući i konsultad	cije	Struktura optere	ćenja: 64 sata (nastava) +	8 sati (priprema) + 18 sa
	-	(dopunski rad)		and a second sec
Navesti obaveze stud	lenata u toku nastave: Stu	denti su obavezni da	pohadaju predavanja i vježbe.	rade seminarski gad, rade ob
kolokvijuma i završni	ispit.			
Literatura:	1 K-1-114 C (1007) Pie	natalogija		
I. Krnjajić D.	1 Knijajić 5. (1967). Filonen (83) Nematofauna nekih no:	vrtarskih kultura gaie	nih u zaštićenom prostoru.	
2. Jama N. (19 3. Barker K.B.	C.C. Carter and Sasser, J.N	N. (1985), An Advand	ed Treatise on Meloidogyne:	Volume I i II.
4. s*lacoh LL	and Bezooijen J.V., (1977).	A manual for practic	al work in nematology.	
Oblici provjere znan	ija i ocjenjivanje:			
Seminar	i rad	10 poena;		
Dva kolo	okvijuma	po 20 poena (ukup	no 40 poena);	
Završni	ispit	50 poena;	samia \$1 magn	
Prelazna	ocjena se dobija ako se kun	nutativno sakupi najn	ange or poen.	
Posebnu naznaku za	preamet:	astavnika koji je pr	ipremio podatke: Dr Igor Pai	ović
	Nanomera:	astarnika koji je pr	Present Presenter and Presenter	
	rapomena;			1
		ALC	LEPTER BY	VICE DEAN
			and the second sec	11-00 1.01
IPADLO.	R.V.	5.0	e ALADTILL	HFFHIRS,
EPARED .	SV:	FØ	R ACADEMIC	AFFAIRS
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NEW VERSION

		FITOFAR	ACIJA				
Sifra predmeta	Status predmeta	Semestar	Broj ECTS kredita	Fond časova			
	Obavezni	VI	6	3P+2V			
Studitable and and a							
orojzvodnja (studij tenja 6.	oji se organizuje: A	kademske dodiploms	ke studije Poljoprivrede, st	udijski program Biljna			
slovlienost drugim prod	matimat Name urland	redita)					
Cilievi iznčavanja predm	etar Uncomputario etad	za prijavijivanje i stus	anje predmeta				
tiihovom primienom kreta	niem u spolinoj sredin	i i zakonskim osnovnim poj	movima o pesticidima, kao i p	problematikom u vezi sa			
a pesticidnim aktivnim m	ateriisma koje se nalaz	te na listi domolionih	na koje regulišu njihov prome	t. Takođe, upoznavanje			
redmeta je i da uputi stude	nte o ličnoj i kolektivo	co na fisti dozvoljenih	za primjenu u poljoprivredi i	drugim oblastima. Cilj			
me i prezime pastavnika	i saradnika: Doe. dr.	Nedeliko Letinović i	pesticida, kao i pružanju prve	pomoći pri trovanju.			
Metod nastave i savladiva	nie gradiva: Predavan	vietko Latinovie i	ar Tatjana Perovic	111 E E			
sadržaj predmeta:	a general resurtan	ga, vijezbe (taboratorij	ske i terenske), samostalan ra	d i konsultacije			
Pripremne nedelje	Priprema i unis senv	ectra					
nedelja Uvrd oblasti primjena pastiola podbilanja utranov do se							
Inedelia	Klasifikacija i nome	nklatura nesticida	e vektora patogena				
II nedelia	Fizičko – hamijeka s	noiatura pestidaida					
V nedelia	Oblici formulacijo p	artigido					
nedelia	I kolakuiium Maha	esticida	1.4				
/I nedelia	Mahanizam dialouna	iizam djelovanja pesta	cida				
/II nedelia	Slobodna padialia	ija pesticida, fungicidi					
/III nedelia	Siooodna nedjelja	1					
V nodelia	Tungicidi, baktericid	1					
nedelia	Zoocidi						
Inedelia	Zoocidi Il kelekulium 11-11						
II nedelia	II KOIOKVIJUM, Herbi	cidi					
III nedelja	Herbicidi						
TV nadalia	Zakonske osnove pro	pizvodnje, prometa i pi	rimjene pesticida				
V nedelja	Posijedice primjene j	pesticida, karenca, ME	0K				
V neucija	Toksikologija pestici	ida i prva pomoć					
vi nedelja	Završni ispit						
avrsna nedelja	Ovjera semestra i upi	is ocjena					
VIII-AAI	Dopunska nastava i p	popravni ispitni rok					
Nedeller	OPT	ERECENJE STUDE	NATA				
Neueilno	N	u semes	tru				
x bredite x 40/30 - 9	Nastava i zav	rsni ispit: 8 sati x 16	= 128 sati				
x kreuna x 40/50 – 8 sati	reophodne pr	ripreme prije početka semestra: (administracija, upis, ovjera) 2x 8 sati = 16					
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1.Šovlianski, Radmila	Lazić Sania (2007): (Jenovi fitoformaciia B	talionaire de l'échete et al. 1 et				
2. Janiić, V. (2005): Fit	tofarmacija Deuttuo za	valtitu hilio Sahilo Do	oljoprivreuni takuitet, Novi S	ad;			
3.Šovljanski, Radmila	Klokočar-Schmit 71a	ta Laziá Sania (2002)	ograd - Banja Luka;				
4. Vitorović, S. Miloše	vić M (2002): Osnov	i toksikologija (2002)	: Praktikum iz fitofarmacije,	Novi Sad;			
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PREPARED BY:

ACLEPTED BY VICE DEAXI FOR ACADEMIC AFFAIRS AJeconocile

On Faculty of Medicine (IPH) during the process of change from individual modules is proposed to allocate more items to one separate module Special epidemiology

2015

Additionally process of reaccreditation of UCG started at 2016. - New subjects proposed Urban zoology and Biocides

http://project-lovcen.me

2014



Tell me and I will forget. Show me and I will reme I et me do it and

Komarac APP Dissemination Photo gallery News Team zon



vledge and

About project

aising threat to Europe strength is difficult t ropnately s wareness among researcher cademic educators and policy-makers.

The resin idea that bot us to proceed this HERC-CR02 project is to excluse a votament of how here and manufacture holder education facilitate training of next generation experts, incrove the national policies, produce innovation and disseminate the related scientific information under the unbelle of surveillence of mosquito vectors and diseases they transmit.

The prject will be realized through a coherent set of research, coordination, dissemination and development actions grouped in four work packages.

We propose top quality innovative research

- propose top quality imrovitiwe research: specification (3T) in invisive mogalito control implementation of the newly released (September 2012). European Centre for Disease Revention and Contol (ECO)⁺ qualitore for the surveillance of invasive mosquitos so Ta Europ²: in the transword of the mole phone goldschol for surveillance of invasive mosquitos pecielas (XMLRPAC). resultation of novel mole of the top of the top of the top of the equations of novel non-pesticide, blodegradable materials for control Resultation of the non-pesticide, blodegradable materials for control Magnetic T, introduction Magnetic T, introduction

- fication of mosquito species present in Montenegro and their
- entification of mosquito vector species:

- identification of mosquito vector species; detection or patrogens carried by mosquito vector species; modelling of climate changes influence on MV and MBD; survey, dissemination and feedback on stakeholder's ophions about direction of the research in vector borne disease prevention; introduction of teaching on MV and MED at already existing courses at BTF and Fecuty of Medicine. University of Mohemergo.

We propose top quality innovative research:

- naces top quary introverse reserch. spplication of 2T in investve mosquito control; implementation of the newly released (September 2012) European Centre for Diseases Prevention and Control (ECDC) 'Guidelines for the surveillance of invasive mosquitoes in Europe' mobile phone application for surveillence of nuesive and indigenous.
- of mosquito larvae

Supported by

4

- Learnington or mosquite species present in Nontenegro and their determinations determinations determinations determination of pathogens carried by mosquito vertor species; modeling of climate changes influence on M/ and MBC introduction of teaching on MC and MBC at already existing course all FT end Faculty of Medicine, University of Modranegroum all FT end Faculty of Medicine, University of Modranegroum all FT end Faculty of Medicine, University of Modranegroum all FT end Faculty of Medicine, University of Modranegroum All FT end Faculty of Medicine, University of Modranegroum Mosquitors

News Fortcoming

Forcoming . 29th November - 4th December - Training visit or researcher from NIV to IPH

Activities on WP1c - mobility to Institute for Public visit/lectures of Tamas Petrovic from NIV to IPH.

Fortcoming : 17th - 20th November - Training visit of re IZSLER to IPH

Activities on WP1c - mobility to institute for visit/lectures of Michele Dottori from IZSLER to IPH Public

Forcoming : 01^{61} - 06^{61} November - Training visits of researchers from IPH to international partner institutions NIV

Activities on WP1a and WP2a - mobility to Scientific Institute in Novi S Training visit for Sanja Medenica and Nebojsa Sekulic from IPH to Tar Petrovic at NIV.

20 10 2016 Lecture at MediPIET - Presentation of Project

in the framework of the WP2k Dissemination and feedback on st in the framework of the WF2R Dissemination and feedback on stakeholders opinions, and international cooperation, at Course of NEDTERNANEAN PROGRAMME FOR INTERVENTION EPIDEMIDLOGY TRAINNING -MedPIEF, Intoolutory course in intervention epidemiology, 1981 - 30th Cotober, 2015 in Bulva. Montenegro, will be organized promotion of HERICL/OCED Project. (Download presentation)

Lecture at University of Montenegro - Eye to Eye with Mosquitoes

28.09.2015 Laboratory open days at Natural History Museum

20 10 2015 Lecture at MediPIET - Presentation of Project achievements

In the framework of the WP2k Disse boble phose application for surveillance of investive and indigenous sequito species KONLARAC; valuation of roven non-pesticide, biodegradable materials for control mosquito Interveit. Fundational of the sequitor intervenion registerio and the sequitor intervenion registerio and the militation of mosquito species present in Montenegro and their HERICALCONCEN Project.

[Download presentation]

Lecture at University of Montenegro - Eye to Eye with

Laboratory open days at Natural History Museum

Forcoming - 27th September-11th October - training on mosquitoes determination to LOVCEN project researchers

and inscuid-batte diseases in 10 Europe, which impact to protect. The main infection pendent on vector and ton, hanned the bate diseases is control of diseases is control of mespadio vectors, newly released European newly released European es for the surveillance of es in Europe ² and Introducing that year of the surveillance of the surveillance of the surveillance of the surveillance is surveillance of the surveillance o	Puppos of the "contrains," Morgano Survaliance Software (MSS) is adia acquation about mosquite species (investive, indigenous, exclup) delibition is identingation, base assi which were applied in the second state of the provide sportunity to us large a possible name of people to have shared a provide sportune provide sportunity to us large a possible name side application is very simple. Objective of applications are: surveillance of investve and badgenous sports, shared and on anopala- distribution and identification of mosquito vector species.	The studies on Climate transport procet and MED adjustion and major transfer of signal love particular, or more an interpret of the standard of the standard Most Interpret, will be initiated through the collaboration between GTP, IMMS and Fo Solil temperature
sludy was conducted more o. Data on mosquito species oity and biting behaviour. foring the appropriate control		

HERIC



(WP2f) – Designing LOVCEN web site

12th January 2015 – 12th June 2016. 7.541 visits (24.8% return visitors) 108 countries, 1.361 cities, 109 likes on FB





(<u>WP2f</u>) – Designing LOVCEN web site								2016		
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Surveillance of invasive and native r and pathogens they transmit in		Fi	ind reco	rded mos	squitos		Pro bond	public!		
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In each table additionally will be a **Recommendation**. (Under constr





(WP2g) – Internal dissemination meetings

25 internal meetings - First research year

2015.

- 12.05. BTF: 1st AM LOVCEN
- 02.04. TSU: PCR and Elisa
- 30.03. BTF: meeting of LMT current issues
- 25.03. UCG: presentation of LOVCEN to UCG academic community
- 02.03. IHMS: meeting with Director of IHMS dedicated to problems for training payments
- 27.02. TSU: mosquito traps
- 18.02. TSU: field magnifiers and -80°C refrigerator
- 09.02. IHMS meeting dedicated to trainings and hosting of researcher from FoA
- 04.02. Meeting of Steering Committee of HERIC and presentation of LOVCEN achievements
- 27.01. IPH meeting dedicated to procurement of new equipment and scientific reports

2014.

- 11.12. HERIC: meeting with evaluators on 1st half year meeting
- 02.12. BTF: meeting with HERIC representatives EMP plan
- 19.11. TSU: IT consultant
- 06.11. NHM and IPH Socio research plan and results
- 22.10. NHM plan and results for Socio research
- 17.10. NHM plan for Socio research
- 16.10. HERIC, TSU, BTF: meeting dedicated to procedure of procurement of equipment
- 10.10. IPH meeting topics: question of dry ice, Zoran Vratnica travel tickets and report, procurement of new equipment for partner institution,
- WP2f, preparing document for Multi country workshop
- 05.09. NHM problems with training at USAMVBT
- 28.08. IPH problems with last two trainings
- 12.08. BTF problem with accountant
- 31.07. IPH: meeting topics contact with Remi Charelle, connection with MediLabSecure, constant problems with dry ice supply, problems with accountant, WP2f
- 16.06. HERIC: Meeting with HERIC and evaluators Support to Projects Leaders
- 13.06. Meeting with representative of municipality Podgorica Actual system of mosquitoes control in Podgorica
- 02.06. BTF: Kick off meeting

(WP2g) – Internal dissemination meetings

19 internal meetings - Second research year

2016.

- 31.05. Ministry of Science meeting dedicated to RRI, presentation of LOVCEN Project
- 20.05. NHM current issues
- 18.05. HERIC presentation of LOVCEN achievements
- 10.05. 2nd Annual Meeting
- 22.03. BTF presentation of the LOVCEN Project to visitors/researchers fromIAEA
- 09.03. IPH meeting dedicated to procurement of goods
- 07.03. HERIC meeting dedicated to procurement of good for IPH
- 22.02. HMZS conclusion meeting with partners

2015.

- 01.12. IPH: procurement of goods
- 25.11. NHM: current issues
- 12.11. IPH: trainings and reports issues
- 16.10. IPH: current issues
- 12.10. NHM: meeting dedicated to Laboratory open day
- 23.09. TSU: procurement 1.1.3 microscopes and magnifiers
- 23.07. IHMS: meeting training in September
- 21.07. IPH: meeting dedicated to procurement of the materials
- 27.05. BTF: meeting with HERIC and World Bank representatives
- 18.05. IPH: meeting current issues
- 12.05. BTF: 1st AM LOVCEN

(WP2h) – Preparing web pages and brochures

Leaflet design:

Front page Original photograph (Salasan 2014) of Asian tiger mosquito How much does mosquito bait costs?

Back page Original photograph (Salasan 2014) of Asian tiger mosquito

Mosquito is the most dangerous animal on the Earth because ability to transmit deadly disease agents (malaria, WNV, Chikungunia, Dengue).

The estimated cost of the West Nile virus outbreak in Texas in 2012 exceeded \$47 million with average per inpatient costs of (medical and loss of productivity - absence from the job) of \$25,000/patient and per outpatient cost of \$1,200/patient.

The average yearly economic cost for dengue in Puerto Rico is over \$38 million, average per patient cost for non-hospitalized versus hospitalized patients was estimate at \$1610 versus \$17,803, respectively.

A cost-of-illness analysis performed on the chikungunya epidemic on La Réunion island (2005–2006) estimated the total cost of medical expenses at 43.9 million euros, of which 60% was attributable to direct medical costs and 40% to the disease related loss of productivity.

Even when not carrying disease agents mosquitoes are repelling and annoying the tourists and local people working and staying outdoor.

Small area of Ticino (Switzerland) with 35.000 inhabitants and 450.000 tourists' loggings loses 2,250.000€/year due to avoidance of the place because of mosquito nuisance (50€ per tourist day) and additional 700.000€ expenditures of local residents on personal protection agents (20€ per resident).

The benefit-cost ratio of 8.64, indicates that each \$1 spent on control of Asian tiger mosquito in New Jersey gave adults additional porch and yard time worth over \$8. In Rhine Valley Germany, the consumer surplus, provided by mosquito control to 2.000.000 inhabitants is estimated to €6.165 million.

(WP2h) – Preparing web pages and brochures



(WP2i) – "Laboratory open days"

On 25. February 2015. has been organized the visit of the students of the high vocational school "Spasoje Raspopović" from Podgorica, to the laboratory of the Institute of Hydrometeorology and Seismology. The students were introduced with the work of the Institute's laboratory, with the accent on the LOVCEN project and involvement of IHMS in the project.

The total number of students, who were attending the lecture was 44, age 15-18 years (from I to IV grade). The students were selected, from different filed of orientation: chemical technician, food technician, environmental protection technician, agricultural technician.



In the framework of the *WP2i "Laboratory open days"*, on 25. September 2015. has been organized the visit of the students from high school "Secondary Medical School" from Podgorica, to the exhibition "Montenegro in Mesozoic period" organized by Natural History Museum of Montenegro and NGO DIV, as a part of 5th Open Science Days, (21st - 25th September, 2015. Podgorica).

The students were introduced with the work of the Natural History Museum, with the accent on the LOVCEN project and involvement of NHM in the project, as well as about mosquitoes from Jura period to present times.

The total number of students, who were attending the lecture was 39, of the age between 15 and 17 years (from I to IV grade). The students were selected by the professors, from different filed of orientation: health, pharmaceuticals, social protection.

(<u>WP2j</u>) – Public (radio, TV, newspapers) appearances

and published papers

20. May 2014.

Portal analitika give news about HERIC Grants

03. June 2014. Romeo Bellini, Dusan Petric and Igor Pajovic were guests on

RTCG 1 – Good morning Montenegro

19. October 2014.

Pobjeda – 12 species of mosquitoes are found during survey in Montenegro

(WP2j) – Public (radio, TV, newspapers) appearances

and published papers

2015

Pajović I., Petrić D., Belini Romeo, Salasan Cosmin, Pajović Ljiljana, Dragićević Snežana and Latinović Nedeljko (2015): Presentation of Project: "Surveillance of invasive and native mosquito vectors and pathogens they transmit in Montenegro – LOVCEN 2014-2017". 3rd scientific meeting with international participation - 5. June – World environment day 04th – 05th June 2015, Bihac, Bosnia and Hercegovina, The Book of Abstracts, p.83

Pajović Igor, Pajović Ljiljana (2015): Mosquitoes resting trap ŽBUN TIN – MNE. 12th BiH Plant Protection Symposium, Mostar, Bosnia and Hercegovina. The Book of abstracts, p. 17

Salasan, C., Petric, D., Bellini, R., Pajovic, Lj, Jovanovic, M., Despotovic, A. and **Pajovic, I.** (2015): Urban social analysis and opportunity assessment of national system for mosquito monitoring in Montenegro. Agriculture and Forestry, 61 (3): 77-86, Podgorica

Igor Pajović, Dušan Petrić, Romeo Bellini and Ljiljana Pajović (2015): First record of *Anoplophora glabripennis* (Coleoptera: Cerambycidae) in Montenegro. *IN PRESS*

Hlavackova K., Dvorak V., Volf P., Halada P., Alten B., Ivovic V., Omeragic J., **Pajovic I.**, Martinkovic F., Mikov O., Stefanovska J. (2016): Exploring Balkan Sand fly fauna using Maldi-tof mass spectrometry. The 3rd Conference on neglected vectors and Vector-borne diseases (EurNegVec) with Management Committee and Working Group Meetings of the COST Action TD1303, Zaragoza May 24-26 2016, Abstract book, p. 49-50.

(WP2k) – Dissemination and feedback on stakeholders opinions

VISIBILITY OF THE PROJECT

Facilitating effective implementation of the Coe and Grant Projects financed by HERIC 16-17th June 2014.

Preventing Vector Borne Diseases Around the Mediterranean and Black Sea Regions by Creating New Networks – MediLabSecure European project (2014-2017) aiming to provide collective responses of viral diseases (respiratory virus and arboviruses) in the Mediterranean and Black Sea regions (19 non-EU countries). Partners from 2014.



TEMPUS IV Project: Lifelong Learning for sustainable agriculture in Alps-Danube-Adriatic region, LifeADA 544585-TEMPUS-1-2013-HR-TEMPUS-JPHESDA.

We propose couple of courses, workshops and modules to introduce MV and MBD in lifelong learning, such as Applied zoology, Urban ecology, Surveillance of MV, etc..

Workshop at University of Montenegro: International Projects of University of Montenegro, 25th March 2015

(WP2k) – Dissemination and feedback on stakeholders opinions

VISIBILITY OF THE PROJECT

On manifestation Science Open Days at University of Montenegro has been organized promotion of HERIC-LOVCEN Project with lecture: **Eye to Eye with Mosquitoes** 25th September 2015

Lecture at MediPIET – Presentation of Project achievements - at Course of MEDITERRANEAN PROGRAMME FOR INTERVENTION EPIDEMIOLOGY TRAINNING - MediPIET, Introductory course in intervention epidemiology, 19-30th October, 2015, Budva, Montenegro.

"LIFE CONOPS" project (LIFE12 ENV/GR/000466) is funded by the European Commission in the framework of the programme LIFE + Environment Policy and Governance. Partners from 2015.

Science-technical agreement between BTF and IPH were singed in May 2016, based on LOVCEN initiative.

European Network for Neglected Vectors and Vector-Borne Infections – **EurNegVec**, COST Action TD1303. Partners from 2014.



(WP2k) – Dissemination and feedback on stakeholders opinions

VISIBILITY OF THE PROJECT

http://project-lovcen.me

European network for sharing data on the geographic distribution of arthropod vectors, transmitting human and animal disease agents – **VectorNet**. The European network for sharing data on the geographic distribution of arthropod vectors, transmitting human and animal pathogens, funded both by the European Centre for Disease Prevention and Control (Stockholm, Sweden) and the European Food and Safety Authority (Parma, Italy).

Visit of VectorNet team for Leishmania and sandfly viruses to Montenegro 8-11th July 2015



Application for organisation of next E-SOVE (European Society for Vector Ecology) Meeting – has been accepted, than canceled. We are accepted for organization of next EMCA (European Mosquito Control Association) Meeting – March 2017. We have support from: Ministry of health; Ministry of sustainable development and tourism; Luštica Bay Montenegro – SME on Lustica; Regional Environmental Center (REC), Montenegro country office; DIV – NGO and Union of Municipalities of Montenegro.



LOVCEN WP3

(WP3) Acquisition of research equipment and innovation capacity building

(WP3a) – Acquisition of research equipment

(WP3b) – Innovation capacity building

(WP3a) – Acquisition of research equipment



(WP3a) – Acquisition of research equipment







(WP3b) – Innovation capacity building

1st year trainings: Good quality research; Scientific writing; Skills for research - skills for life! 2nd year: Presentation skills; Proposal writing.





University of Montenegro Biotechnical faculty



L®VCEN

Surveillance of invasive and native mosquito vectors and pathogens they transmit in Montenegro

Thank you http://project-lovcen.me