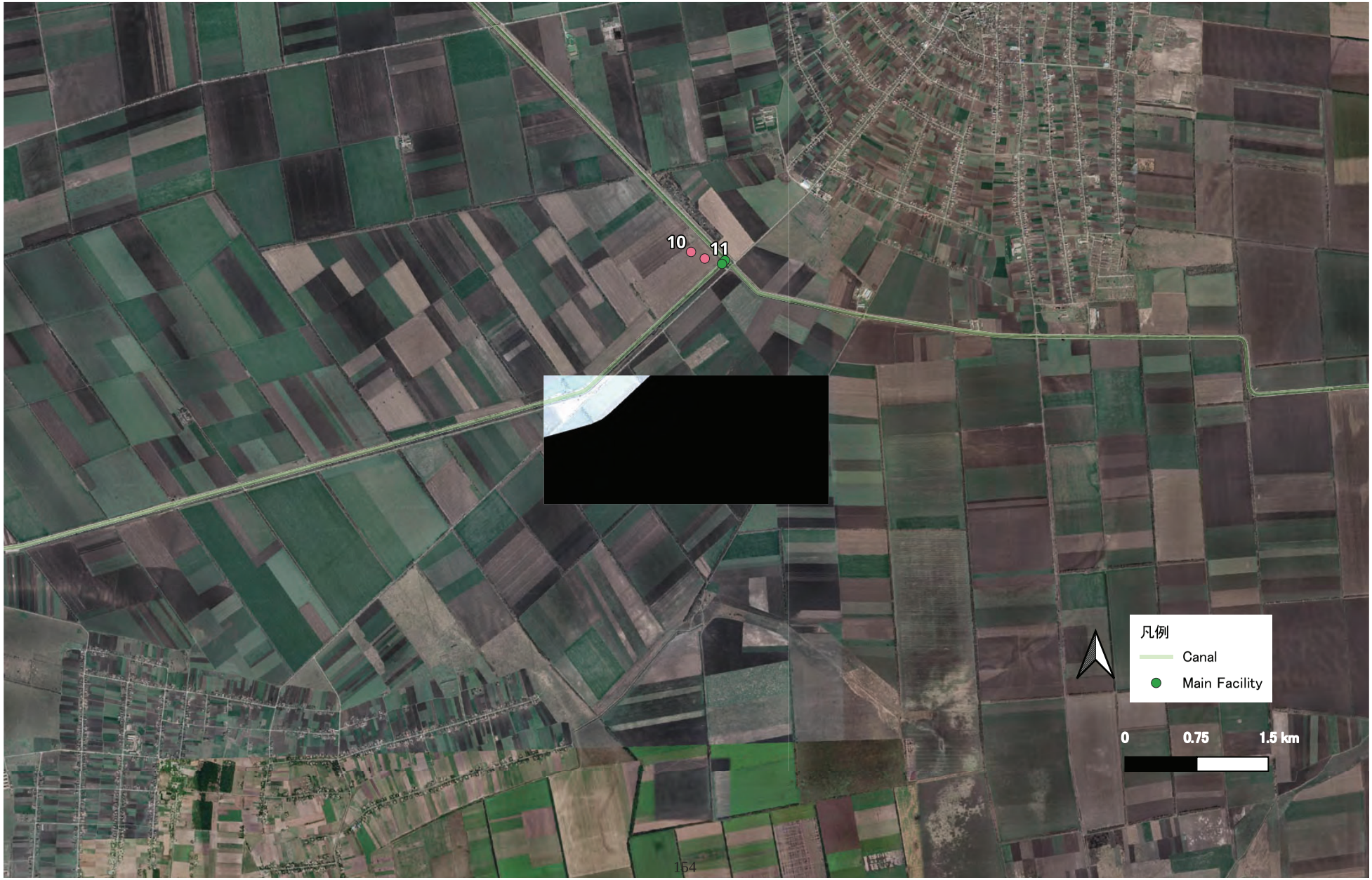
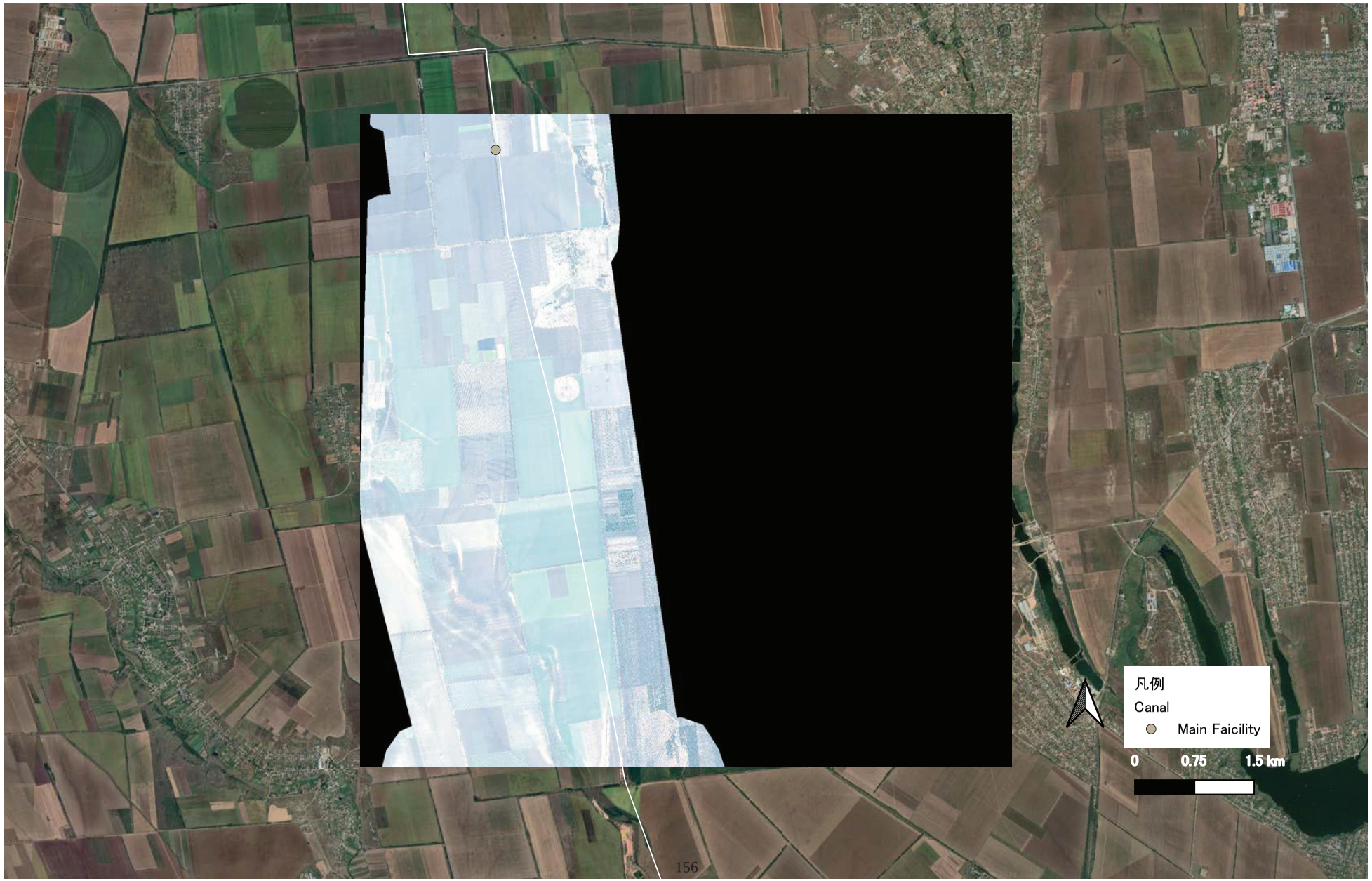
Zaporizhzhia Canal、2023/3/9、R3C2



Lower Dniester、2022/3/23、R1C1

155

Lower Dniester、2022/3/23、R2C1



156

Lower Dniester、2022/3/23、R3C1

Lower Dniester、2022/3/23、R4C1

158

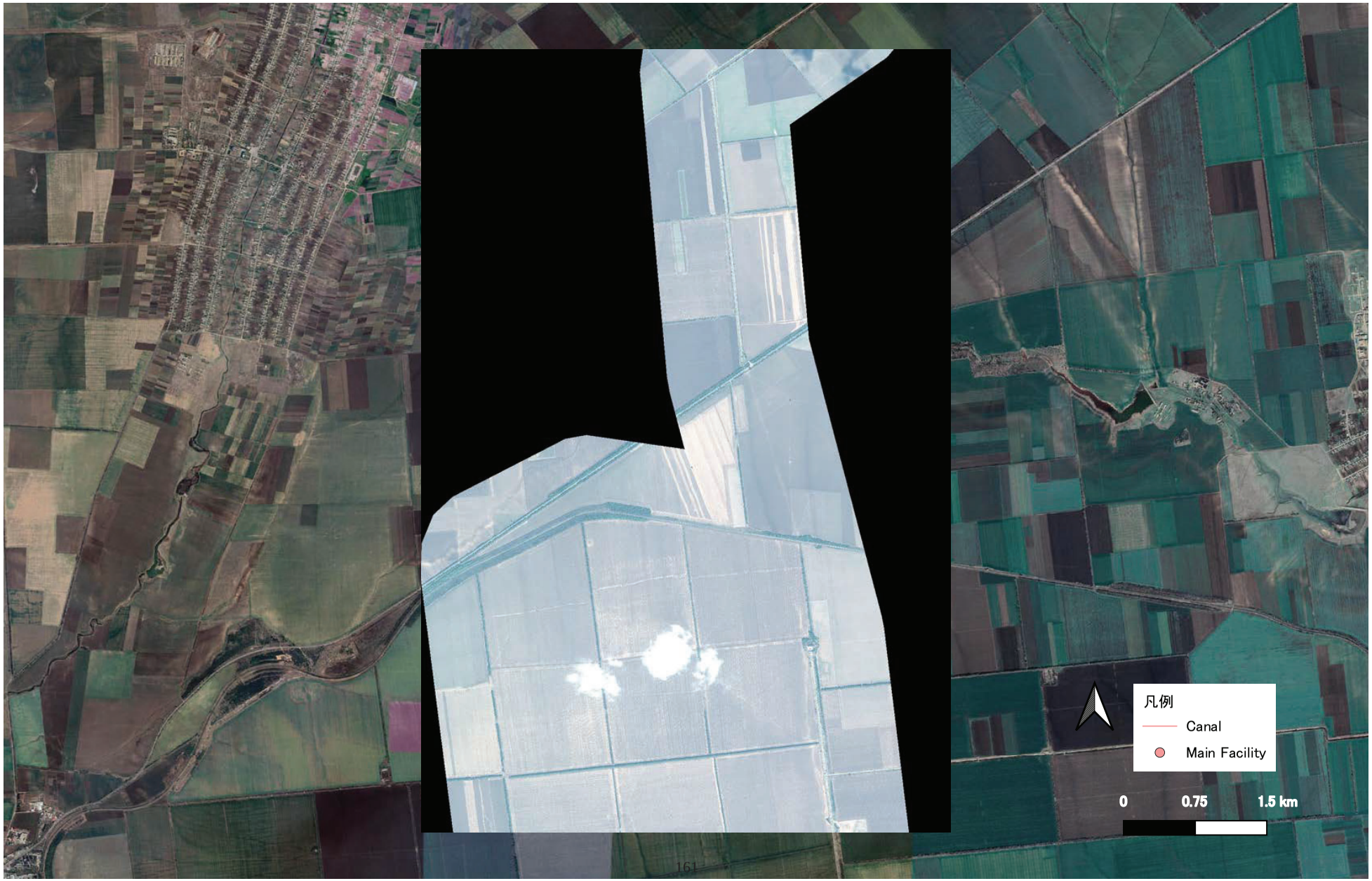
Lower Dniester、2022/3/23、R4C2

159

Danube Dniester North、2022/8/29//、R1C1

160

Danube Dniester North、2022/8/29、R2C1



Danube Dniester North、2022/8/29、R3C1

Danube Dniester North、2022/8/29、R1C1

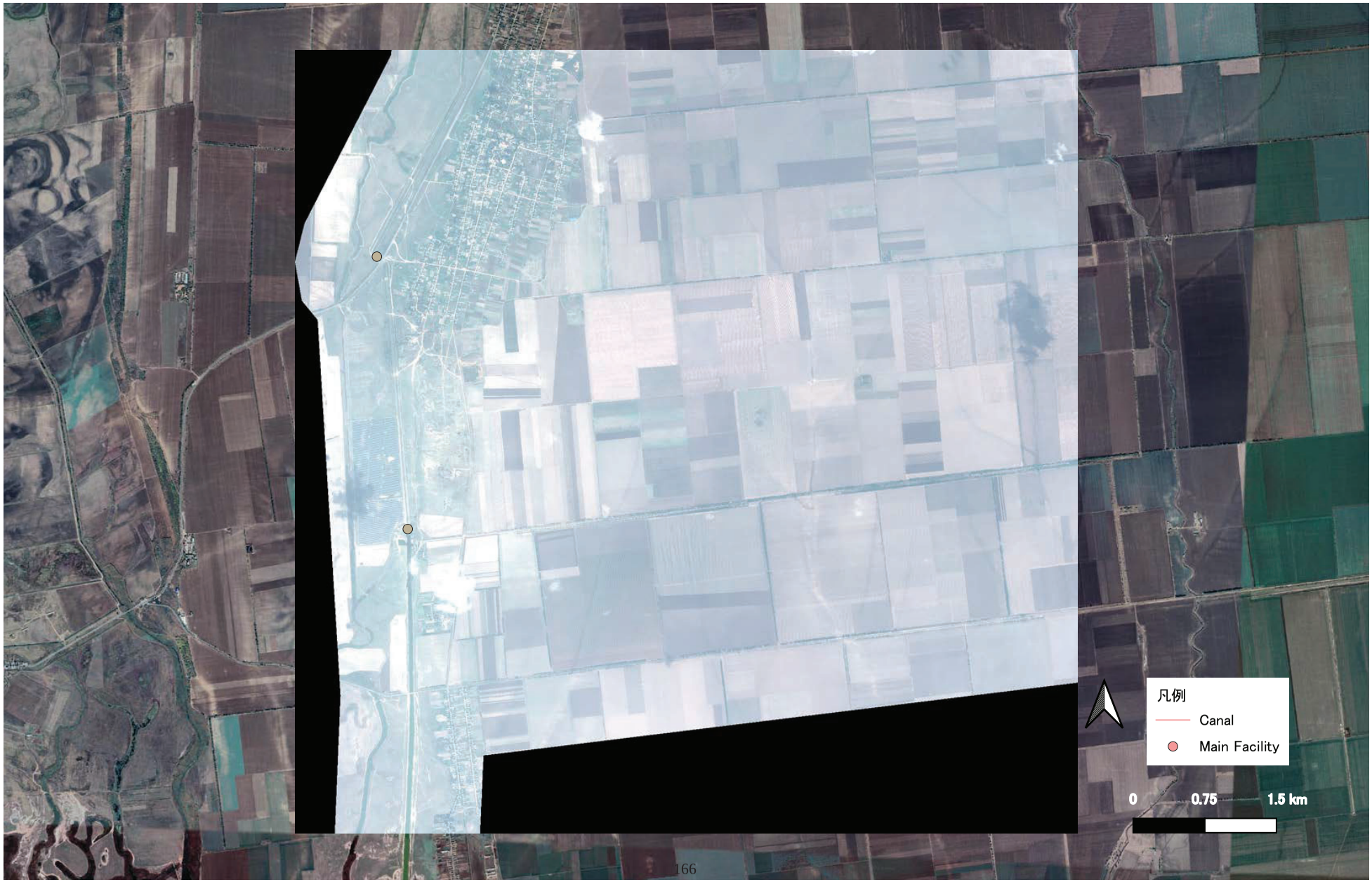
Danube Dniester North、2022/8/23、R1C1

164

Danube Dniester North、2022/8/23、R1C2

165

Danube Dniester North、2022/8/23、R2C1



166

Danube Dniester North、2022/8/23、R2C2

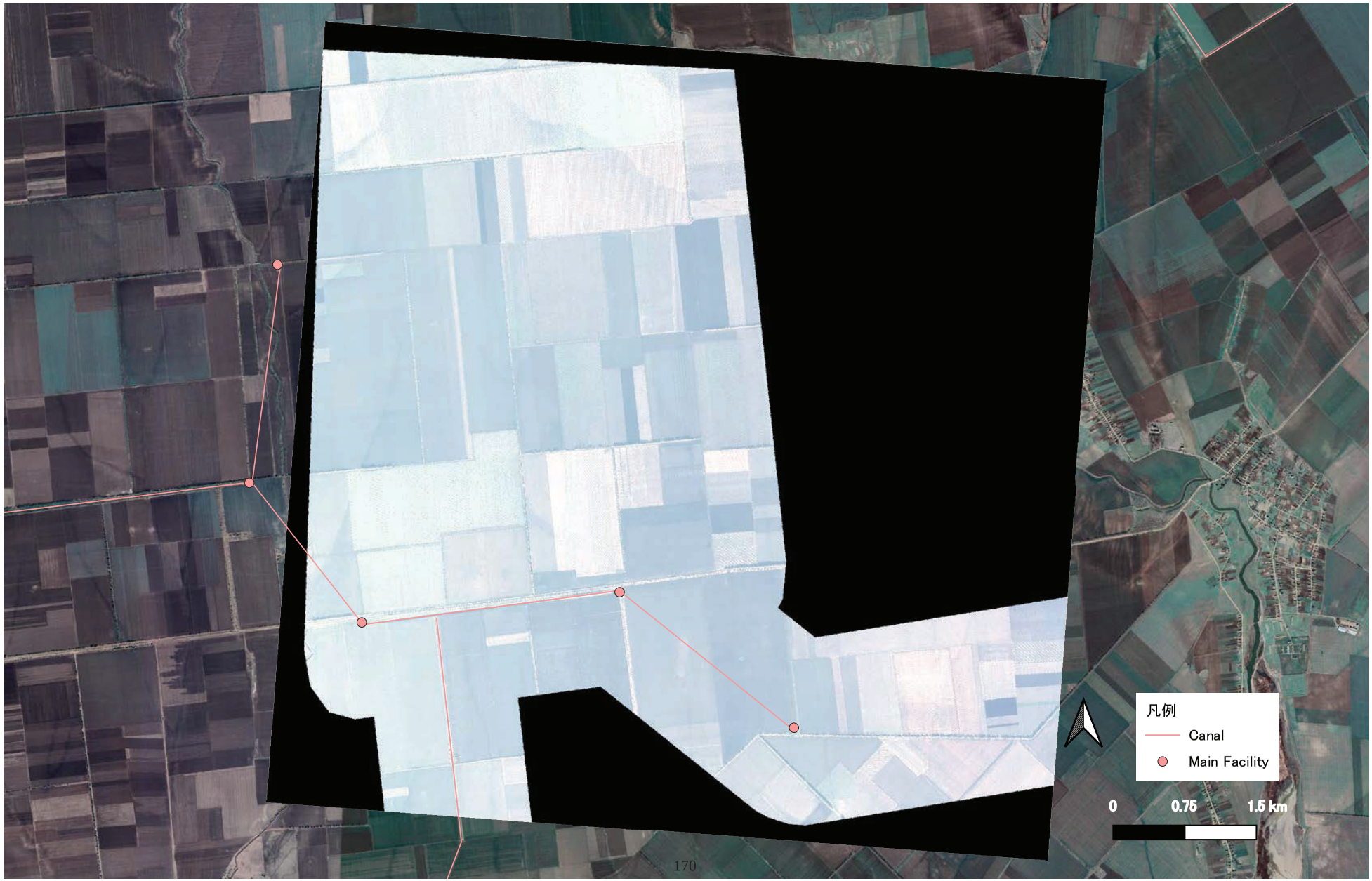
167

Danube Dniester North、2022/8/23、R3C1

168

Danube Dniester North、2022/8/23、R3C2

Danube Dniester South、2022/12/27、R1C1

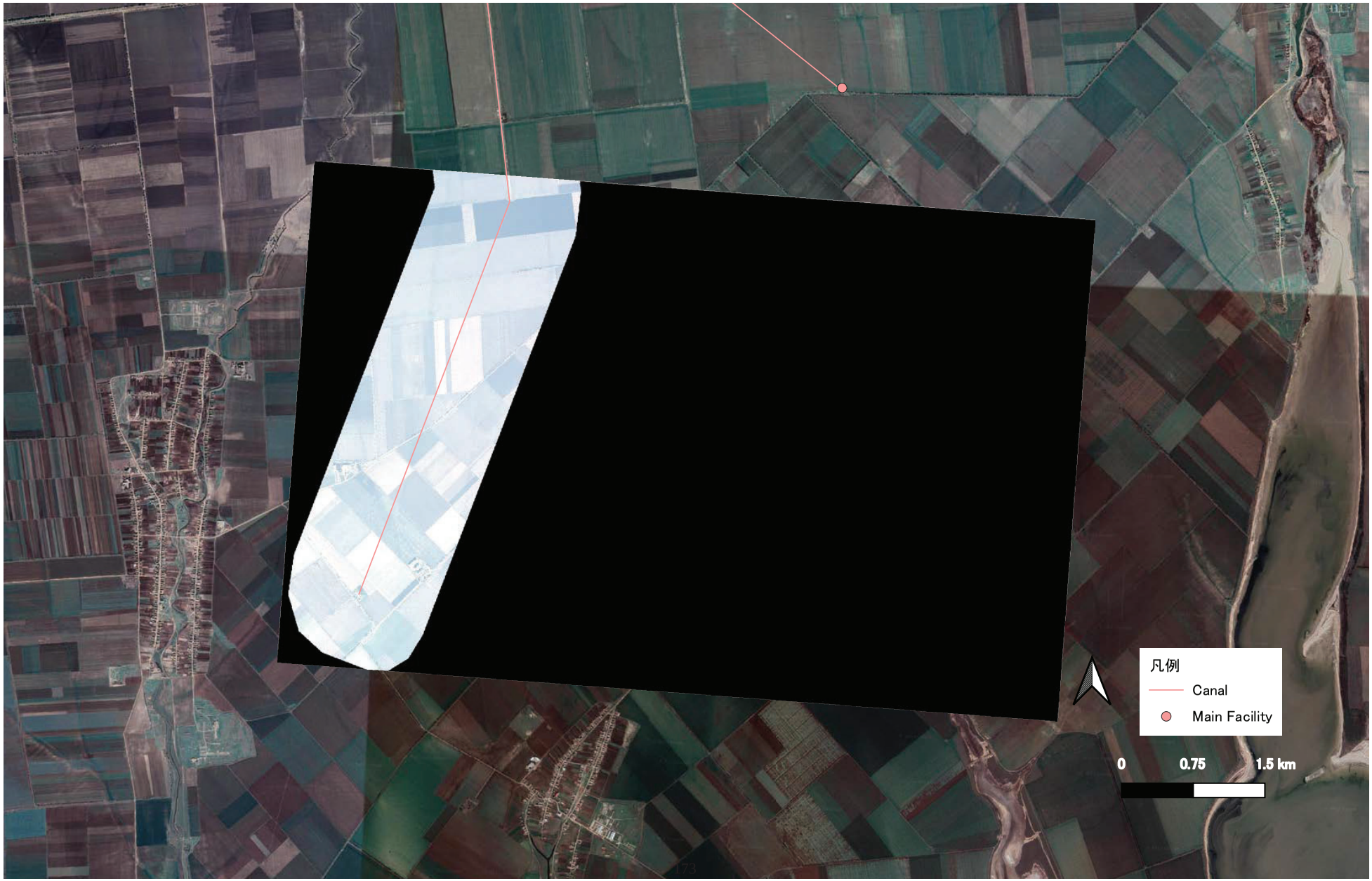


170

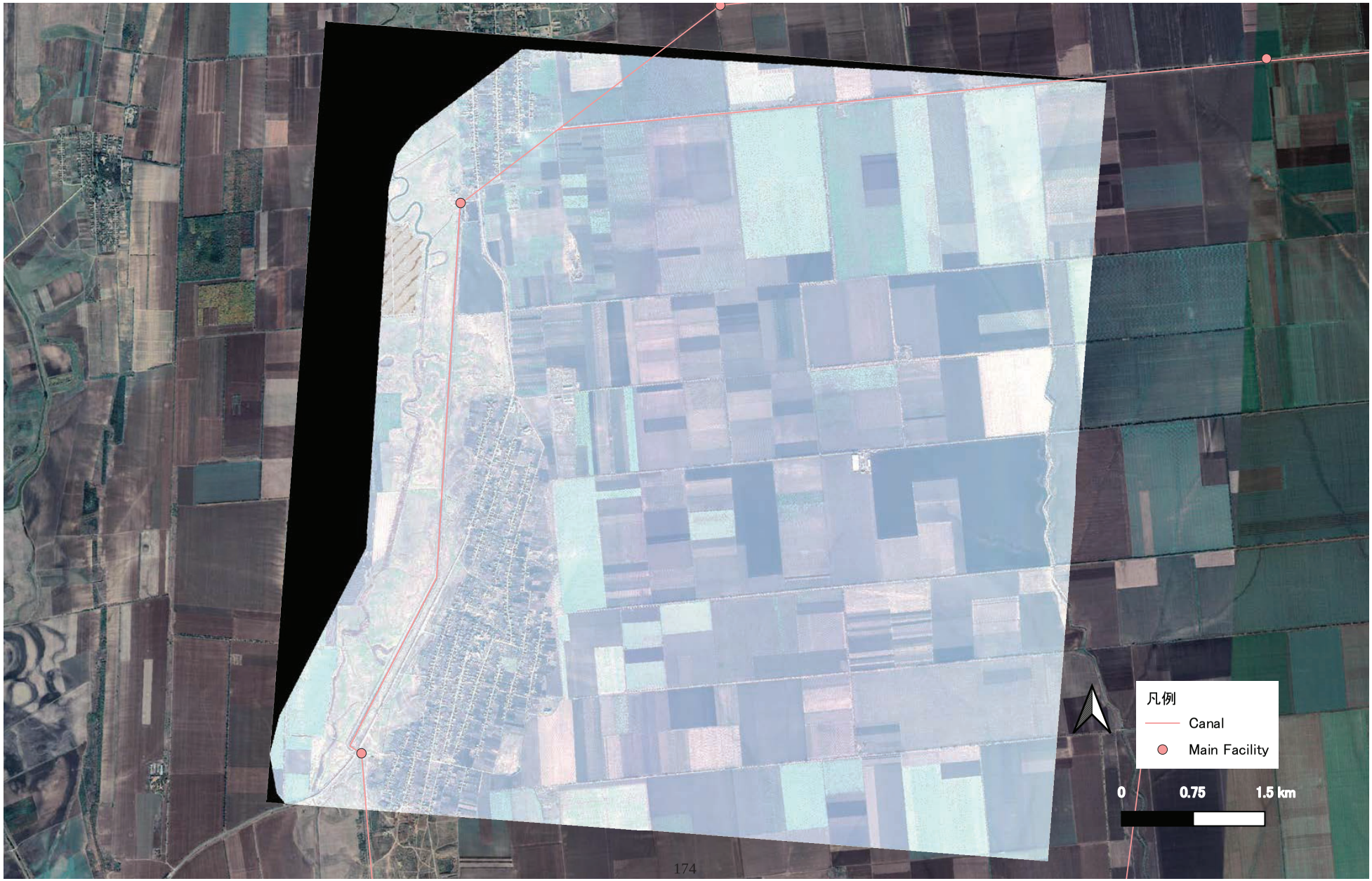
Danube Dniester South、2022/12/27、R1C2

Danube Dniester South、2022/12/27、R1C3

Danube Dniester South、2022/12/27、R2C1



Danube Dniester South、2022/12/27、R1C1



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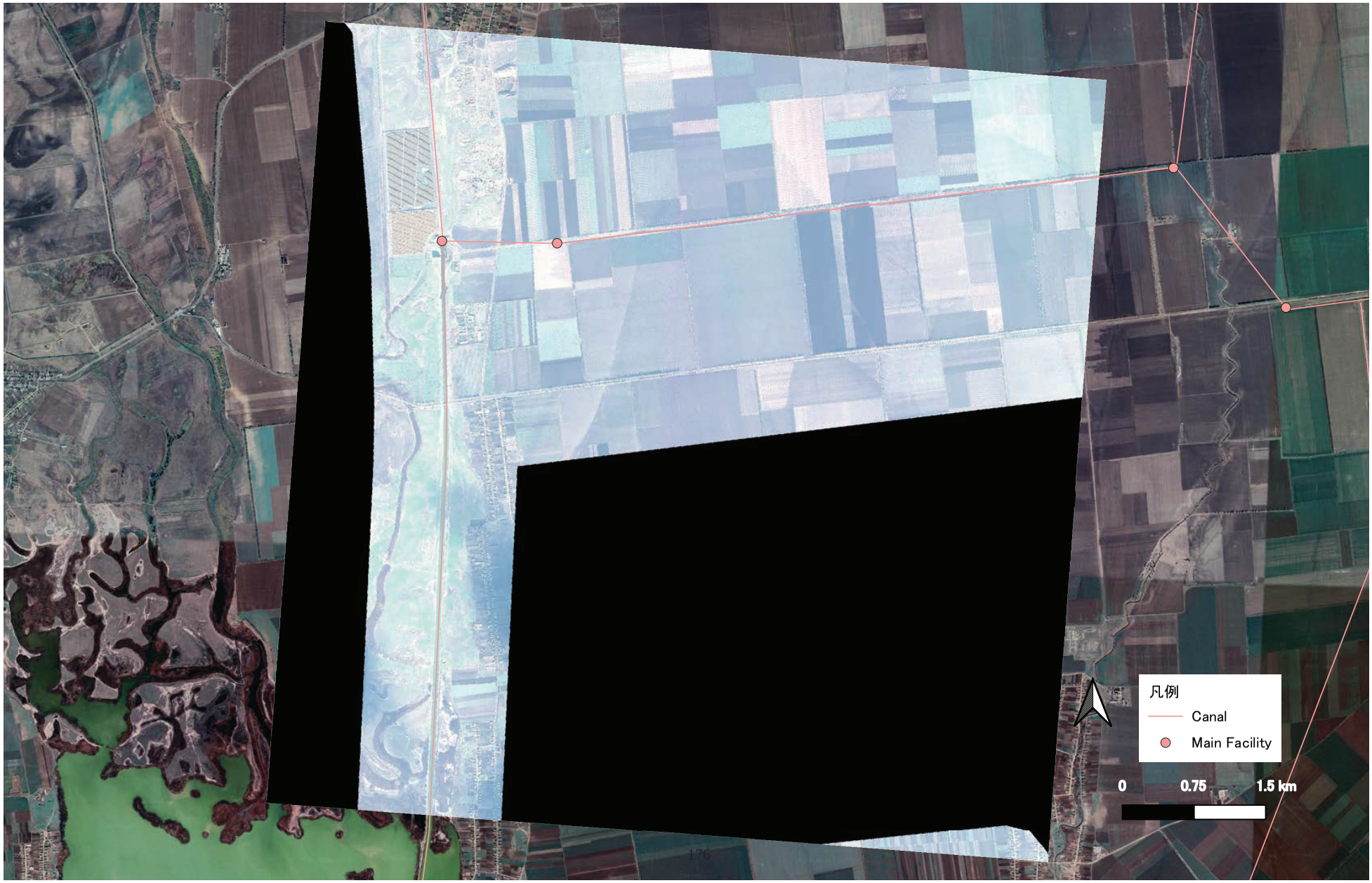
Danube Dniester South、2022/12/27、R1C2

175

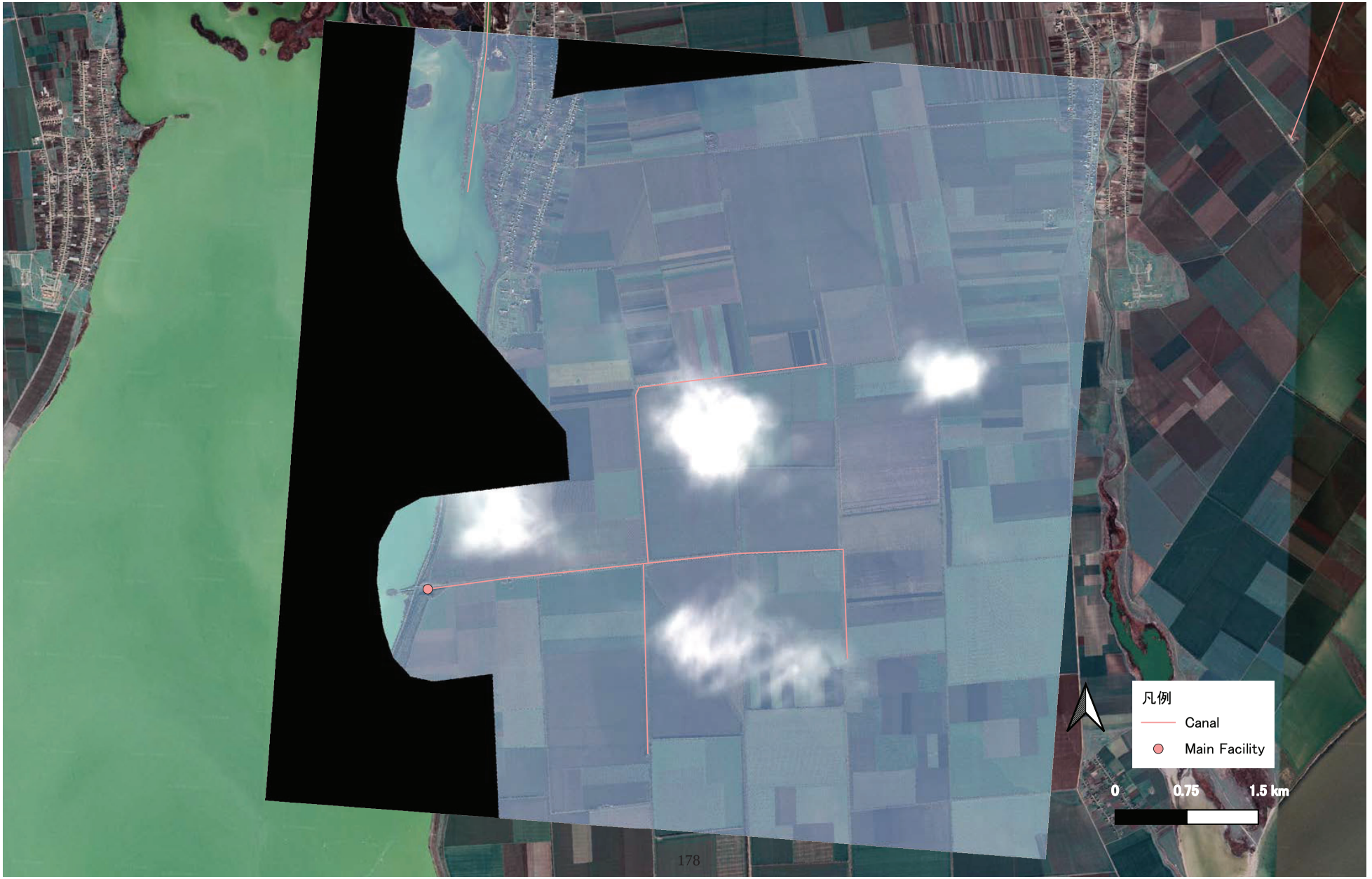
Danube Dniester South、2022/12/27、R2C1



176

Danube Dniester South、2022/12/27、R2C2

Danube Dniester South、2022/12/27、R3C1



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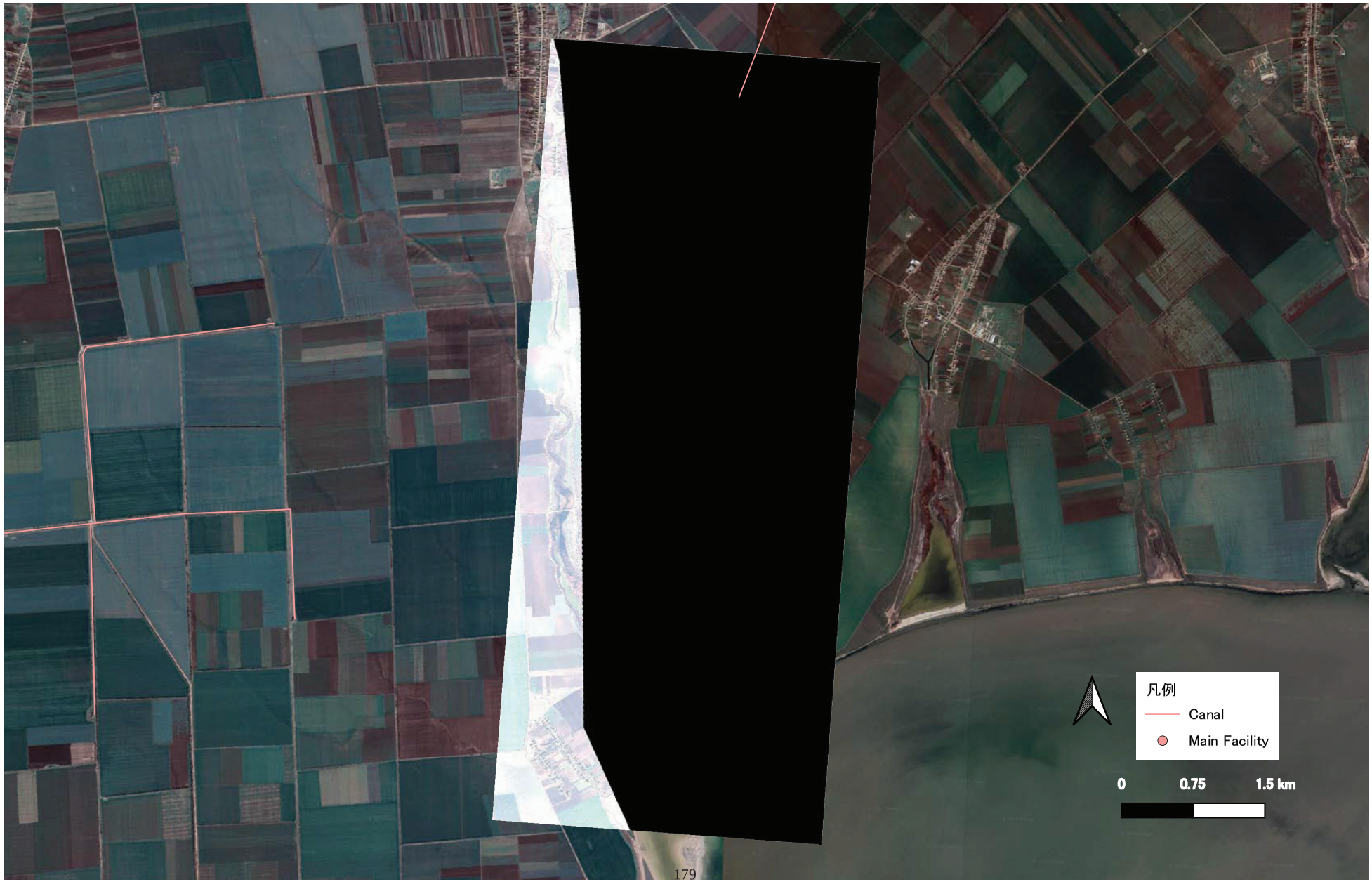
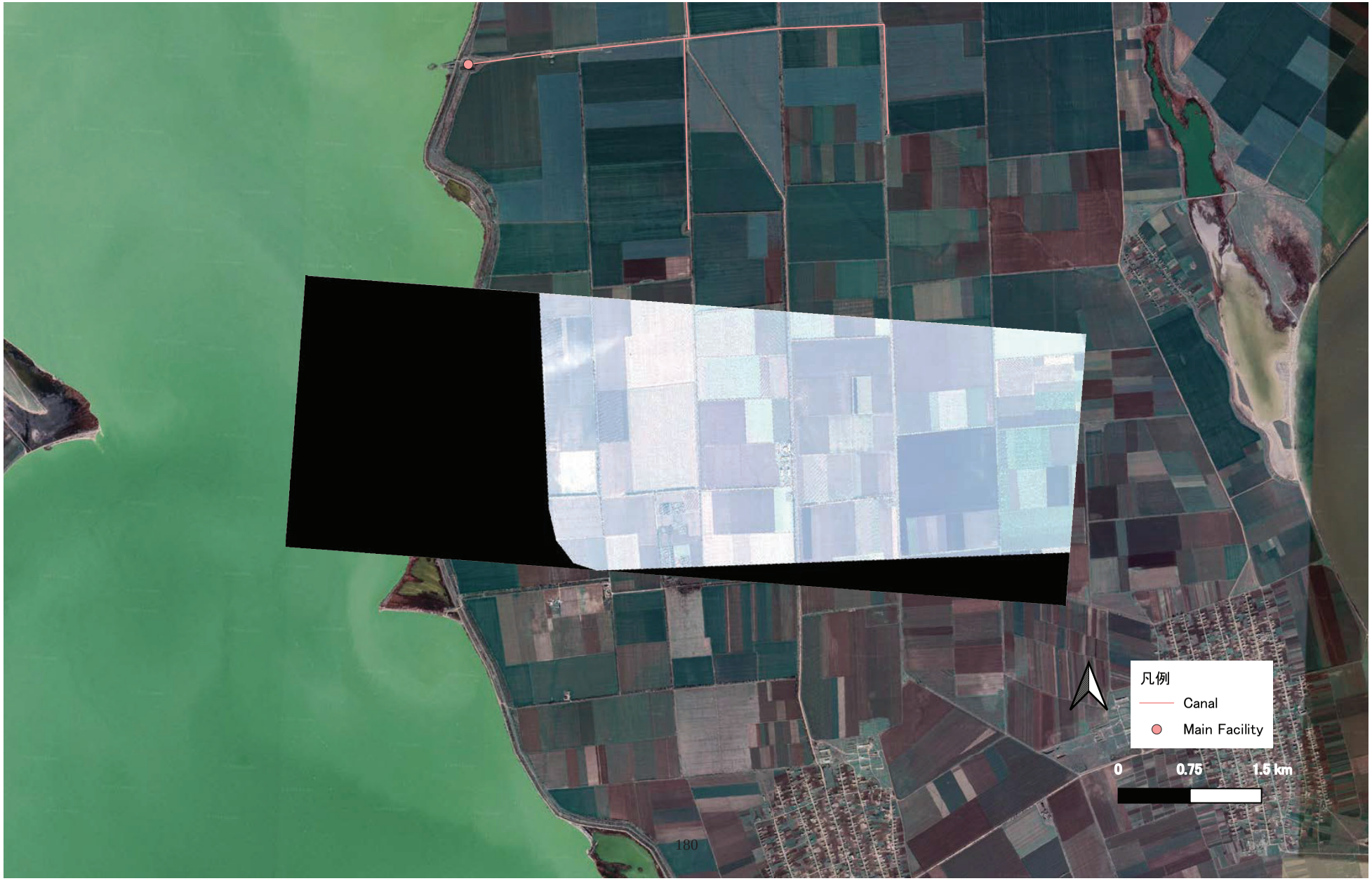
Danube Dniester South、2022/12/27、R3C2



179

Danube Dniester South、2022/12/27、R4C1



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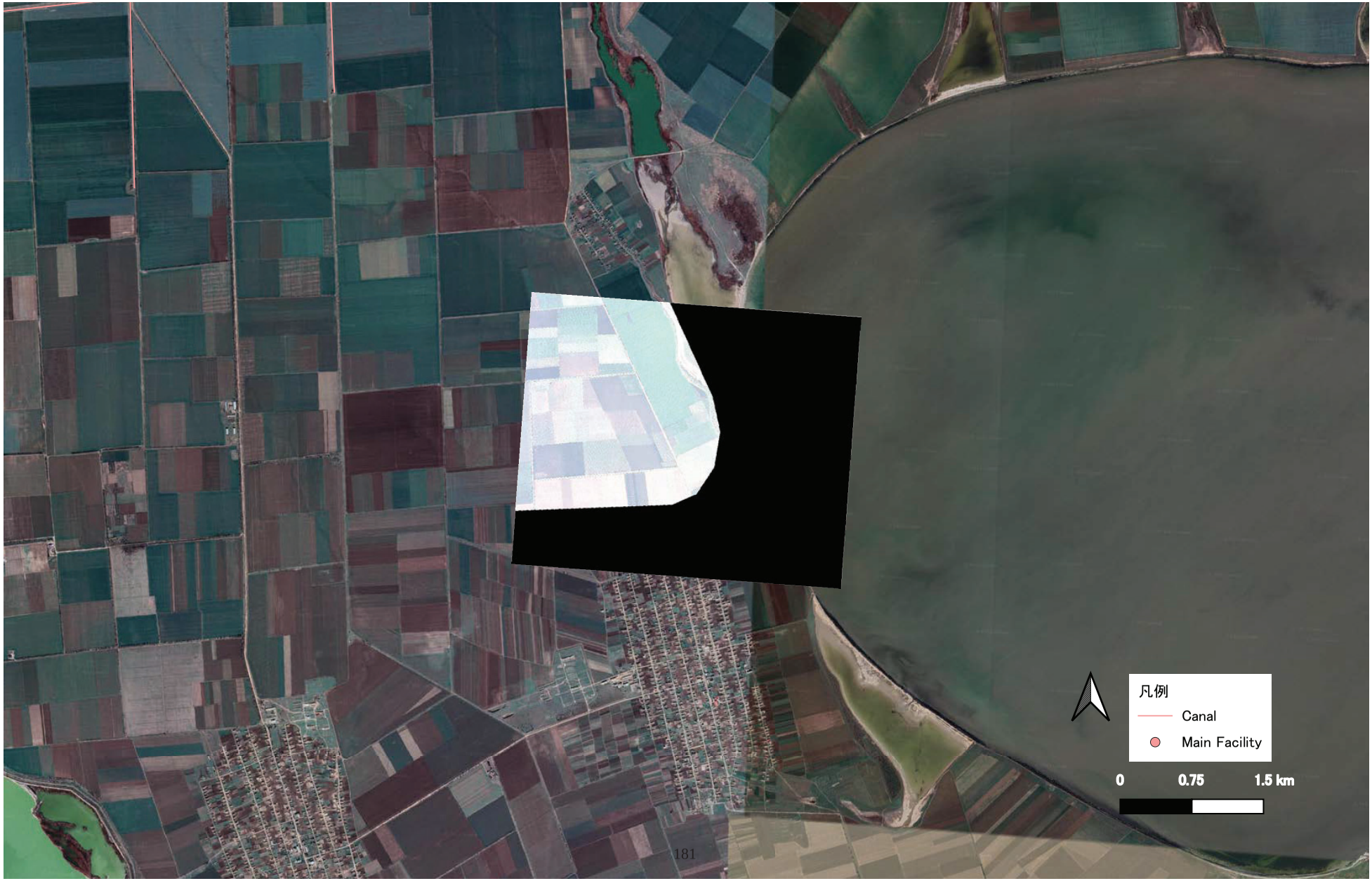
Danube Dniester South、2022/12/27、R4C2



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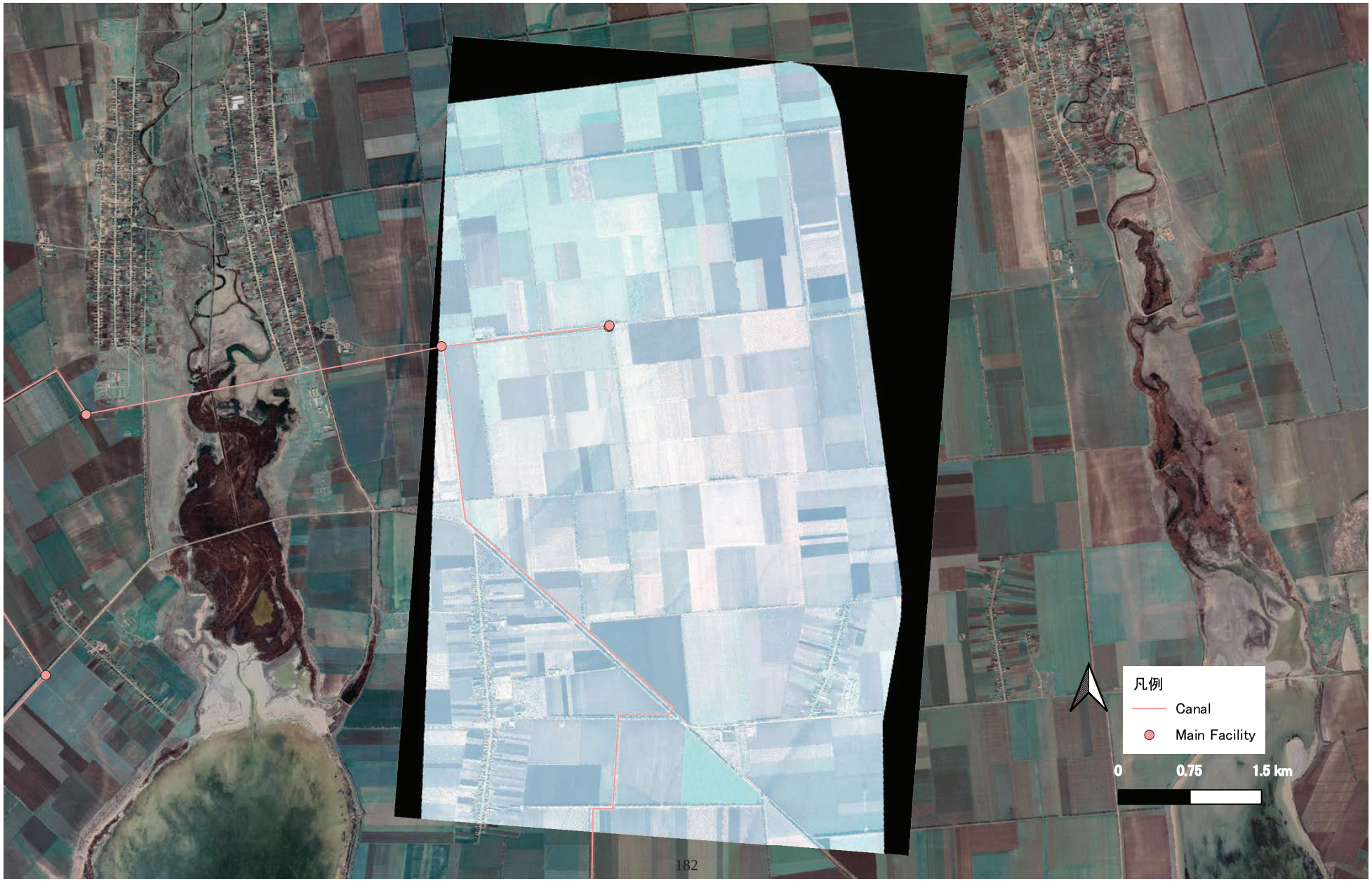
Danube Dniester South、2022/12/28、R1C1



182

Danube Dniester South、2022/12/28、R2C1

183

Annex 2.2.11

Candidate Irrigation Systems for Restoration

Annex 2.2.11 Candidate Irrigation Systems for Restoration

(1) Odesa Oblast

Table B2.2.10.1 List of Irrigation Systems for Restoration in Odesa Oblast (1/3)

		1					
Name of Irrigation System	Bolgrad-Reni-Izmail irrigation systems and filling of lakes						
	Nahirnyanska IS	Kotlovynska IS	Banivska IS	Belgorod-Dnistrovska IS	Kiliyska IS	Tashbunarska
Oblast	Odesa	Odesa	Odesa	Odesa	Odesa	Odesa
Water Resources	Kagul lake	Yalpug lake	Katlabuh lake	Dnister river	Danube river	Katlabuh Lake
Current Area (ha)**	1074	745	315	4309	3200	372
Area (after restoration)***	project 1203	project 781	project 1231	project 11937	project 4832	project 1398
Nos. of Users		6	2	43	7	2
Name of WUO (if registered)*	"Nahyrnyansky Lan"					
Name of Major Crops	Corn, wheat, barley, soybeans,sunflower, potatos, vegetables, fruits, berries,melons, grapes	Corn, wheat, barley, soybeans,sunflower, potatos, vegetables, fruits, berries,melons, grapes	Corn, wheat, barley, soybeans,sunflower, potatos, vegetables, fruits, berries,melons, grapes	Corn, wheat, barley, soybeans,sunflower, potatos, vegetables, fruits, berries, grapes	Corn, wheat, barley, soybeans, rice, sunflower, potatos, vegetables, fruits, berries, grapes	Corn, wheat, barley, soybeans,sunflower, potatos, vegetables, fruits, berries,grapes
Current Situation of Facilities						
No. of Pumps	pump stations 2	pump stations 2	pump stations 1	pumping stations 11	pumping stations 5	pumping stations 1
(Operational)						
Pipelines (km)	3.891	8.886	0.225	18	6.345	10.1
Open channels (km)	2.888			52	189.895	
Lined Channel	0.43			43.7	20.417	
Unaligned Channel	2.458			8.3	169.453	
Drainage Network (km)						
Closed drainage					4.235	
Open drainage					281.02	
Renovation Plan	The system needs to be modernized	The system needs to be modernized	The system needs to be modernized	The system needs to be modernized	The system needs to be modernized	The system needs to be modernized
Pumping station (Nos.)	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable
Pumps (Nos)	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable
Transformers	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable
Open Channel (km)	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable
Pipelines (km)	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable
Estimated Cost for the Renovation	Inventory and audit are being conducted in the process of transfer from the State Water Resources Agency of Ukraine to the State Agency of Land Reclamation and Fisheries of Ukraine. The amount of investment is currently undetermined. Estimated project documentation is being developed.					

Source: Ministry of Agrarian Policy and Food

*WOU can be established on the IS part

** Area irrigated in past 3 years

***Area provided by the project of IS

Table B2.2.10.1 List of Irrigation Systems for Restoration in Odesa Oblast (2/3)

	1					
Name of Irrigation System	Bolgrad-Reni-Izmail irrigation systems and filling of lakes					
	Banivska IS	Michurinska IS	Liskivska rice IS	Suvorovskaya IS	Izmailsk IS	Troitsko-Gradenitska IS
Oblast	Odesa	Odesa	Odesa	Odesa	Odesa	Odesa
Water Resources	Katlabuh Lake/Banivske reservoir	Danube River	Danube River	Katlabuh Lake	Katlabuh Lake	Turunchuk River
Current Area (ha)**	84	425	2027	2538	920	Not in use since 2013
Area (after restoration)***	project 1546	project 1016	project 3859	project 10290	project 4080	project 5175
Nos. of Users	4	3	3		6	
Name of WUO (if registered)*				"Voda Zhyttya"		
Name of Major Crops	Corn, wheat, barley, soybeans,sunflower, potatos, vegetables, fruits, berries,grapes	Corn, wheat, barley, soybeans, sunflower, potatos, vegetables, fruits, berries, grapes	Corn, wheat, barley, soybeans, rice, sunflower, potatos, vegetables, fruits, berries,grapes	Corn, wheat, barley, soybeans, sunflower, potatos, vegetables, fruits, berries, grapes	Corn, wheat, barley, soybeans, sunflower, potatos, vegetables, fruits, berries,melons, grapes	Corn, wheat, barley, soybeans, sunflower, potatos, vegetables, fruits, berries, grapes
Current Situation of Facilities						
No. of Pumps	pumping stations 2	pumping stations 1	pumping stations 2	pumping stations 12	pumping stations 3	pumping stations 4
(Operational)						
Pipelines (km)	0.428	0.818	4.473	31.8	9.9	4.1
Open channels (km)	0.49	2.248	4.913	39.7	19.6	12.9
Lined Channel			0.44	7.9	9.67	12.9
Unaligned Channel	0.49	2.248	4.473	31.8	9.93	
Drainage Network (km)						
Closed drainage						5.2
Open drainage		44.36	179.71	1.7	12	
Renovation Plan	The system needs to be modernized	The system needs to be modernized	The system needs to be modernized	The system needs to be modernized	The system needs to be modernized	The system needs to be modernized
Pumping station (Nos.)	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable
Pumps (Nos)	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable
Transformers	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable
Open Channel (km)	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable
Pipelines (km)	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable
Estimated Cost for the Renovation	Inventory and audit are being conducted in the process of transfer from the State Water Resources Agency of Ukraine to the State Agency of Land Reclamation and Fisheries of Ukraine. The amount of investment is currently undetermined. Estimated project documentation is being developed.					

Source: Ministry of Agrarian Policy and Food

*WOU can be established on the IS part

** Area irrigated in past 3 years

***Area provided by the project of IS

Table B2.2.10.1 List of Irrigation Systems for Restoration in Odesa Oblast (3/3)

	2	3	4	5
Name of Irrigation System	Danube-Dniester Irrigation System (DDIS)	Lower Dniester Irrigation Systems	Reni irrigation system	Tatarbunary irrigation system
Oblast	Odesa	Odesa	Odesa	Odesa
Water Resources	Sasyk (Kunduk) Lake	Dniester River	Danube river, grounwater	Danube river
Current Area (ha)**	There has been no irrigation since 2005	15	Not in use since 1995	5968
Area (after restoration)***	18.86	37.6	project area 818 ha	Project area 19535
Nos. of Users	0	68		66
Name of WUO (if registered)*				
Name of Major Crops	Corn, wheat, barley, soybeans,sunflower, potatos, vegetables, fruits, berries, grapes	Corn, wheat, barley, soybeans,sunflower, potatos, vegetables, fruits, berries, grapes	Corn, wheat, barley, soybeans,sunflower, potatos, vegetables, fruits, berries, grapes	Corn, wheat, barley, soybeans, sunflower, potatos, vegetables, fruits, berries, grapes
Current Situation of Facilities				
No. of Pumps	43	37	4	Pump stations 12
(Operational)		24		
Pipelines (km)	65.22	82.2	1.111	202.373
Open channels (km)	131.43	43.3		160.904
Lined Channel	95.46	43.3		140.074
Unaligned Channel	35.97			20.83
Drainage Network (km)	405.03	532		17.56
Closed drainage	357.43	532		
Open drainage	47.6		6.45	17.56
Renovation Plan	The system needs to be modernized	The system needs to be modernized	The system needs to be modernized	The system needs to be modernized
Pumping station (Nos.)	43	10	Data is unavailable	Data is unavailable
Pumps (Nos)	155	6	Data is unavailable	Data is unavailable
Transformers	Data is unavailable	5	Data is unavailable	Data is unavailable
Open Channel (km)	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable
Pipelines (km)	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable
Estimated Cost for the Renovation	Inventory and audit are being conducted in the process of transfer from the State Water Resources Agency of Ukraine to the State Agency of Land Reclamation and Fisheries of Ukraine. The amount of investment is currently undetermined. Estimated project documentation is being developed.			

Source: Ministry of Agrarian Policy and Food

*WOU can be established on the IS part

** Area irrigated in past 3 years

***Area provided by the project of IS

(2) Other Oblasts

Table B2.1.10.2 List of Irrigation Systems for for Restoration other than Odesa Oblast

	1	2	3	4	5
Name of Scheme	Kilchenska Irrigation System (WUA Dnipro Woda)	Kalynivska Irrigation System (WUA Kalynivska)	Hardyz'ka Irrigation System	Maxymivska Irrigation System	Karpivsaka Irrigation System (WUA Aqua Life)
Oblast	Dnipro	Dnipro	Poltavska	Poltavska	Poltavska
Water Resources	Samara river	Dnipro	Kremenchugh Reservoir	Kremenchugh Reservoir	Kamisnske Reservoir
Current Area (ha)	26 500	750	5 627	The irrigation system is currently mothballed.	496
Area (after restoration)	35 500	1 300	8 188	1 086	3 745
Nos. of Users	43	6	10	0	1
Current Situation of Facilities					
No. of Pump	28	11	6	Data is unavailable	2
(Operational)	26	3	6	Data is unavailable	1
Pipeline (km)	25,9	10	16,7	Data is unavailable	69
Open channels (km)	110,9		169,5	Data is unavailable	
Lined Channel	110,9		11,1	Data is unavailable	
Unlined Channel			158,4	Data is unavailable	
Drainage Network (km)					
Closed drainage					
Open drainage					
Renovation Plan					
Pumping station (Nos.)	2	2	1	Data is unavailable	1
Pumps (Nos)	1	8	Data is unavailable	Data is unavailable	Data is unavailable
Transformers (nos)	1	Data is unavailable	Data is unavailable	Data is unavailable	Data is unavailable
Open Channel (km)			Data is unavailable	Data is unavailable	Data is unavailable
Pipeline (km)	4	7	Data is unavailable	Data is unavailable	Data is unavailable
Estimated Cost for the Renovation	An inventory and audit is being conducted in the process of transferring the property from state ownership to the WUA. The amount of investment is not yet determined. Estimated project documentation is being developed.	An inventory and audit is being conducted in the process of transferring the property from state ownership to the WUA. Predetermined objects of reconstruction: 2 pumping stations, pool, pumps, shut-off fittings, filtering equipment. The amount of investment is currently undetermined. Estimated project documentation is being developed.	An inventory and audit is being conducted in the process of transferring the property from state ownership to the WUA. The amount of investment is not yet determined. Estimated project documentation is being developed.	Inventory and audit are being conducted in the process of transfer from the State Water Resources Agency of Ukraine to the State Agency of Land Reclamation and Fisheries of Ukraine. The reconstruction project is at the stage of developing design and estimate documentation for further making the most appropriate decisions.	An inventory and audit is being conducted in the process of transferring the property from state ownership to the WUA. The amount of investment is not yet determined. Estimated project documentation is being developed.

Source: Ministry of Agrarian Policy and Food

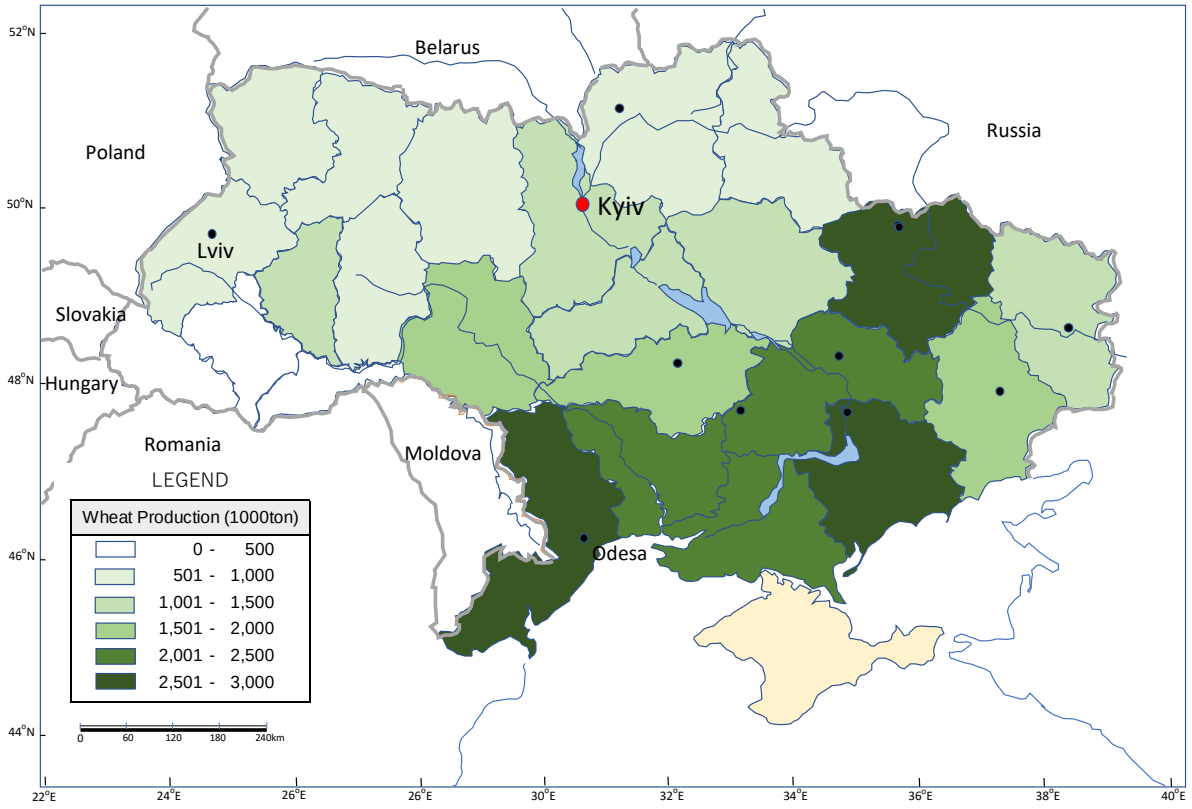
Annex 2.3.1

Crop Production Charts by Oblast in 2021 and 2022 (Cereals and Legumes)

Annex 2.3.1 Crop Production Charts by Oblast in 2021 and 2022 (Cereals and Legumes)

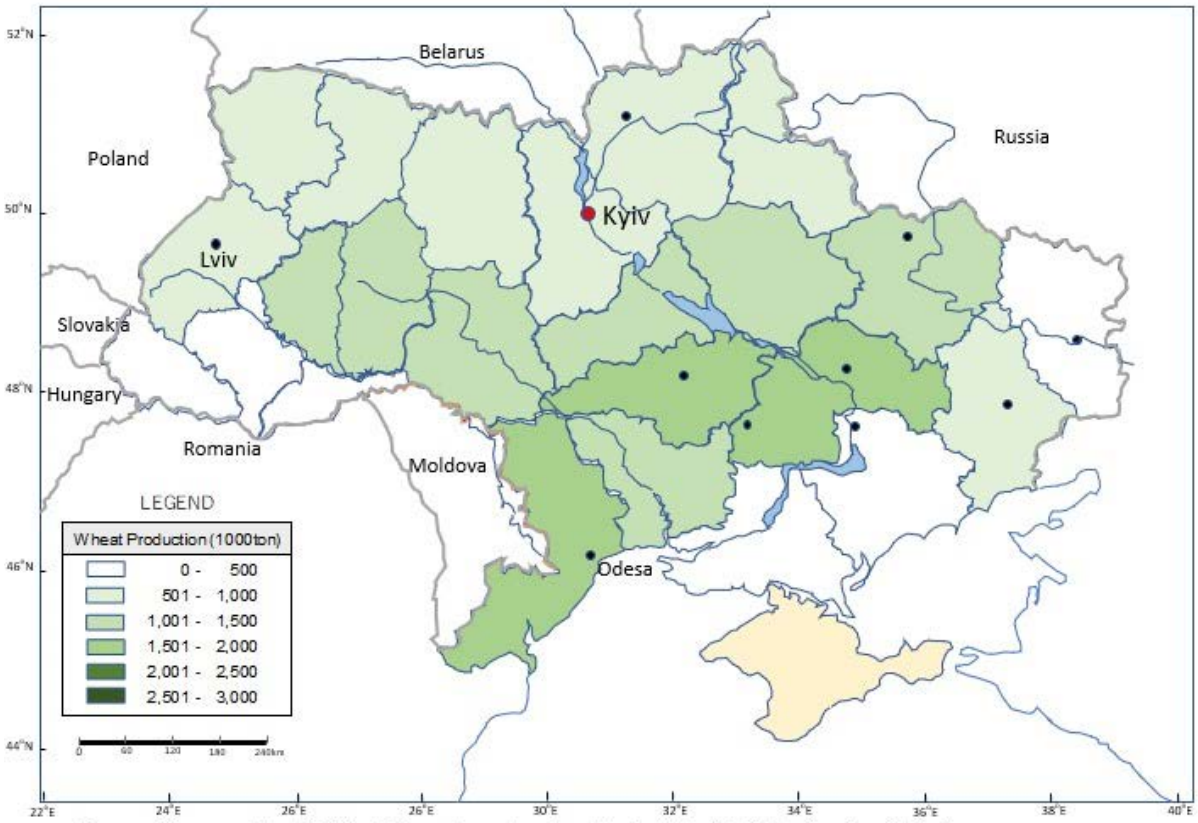
Crop Production Charts by Oblast in 2021 and 2022

Section I : Cereals and Legumes



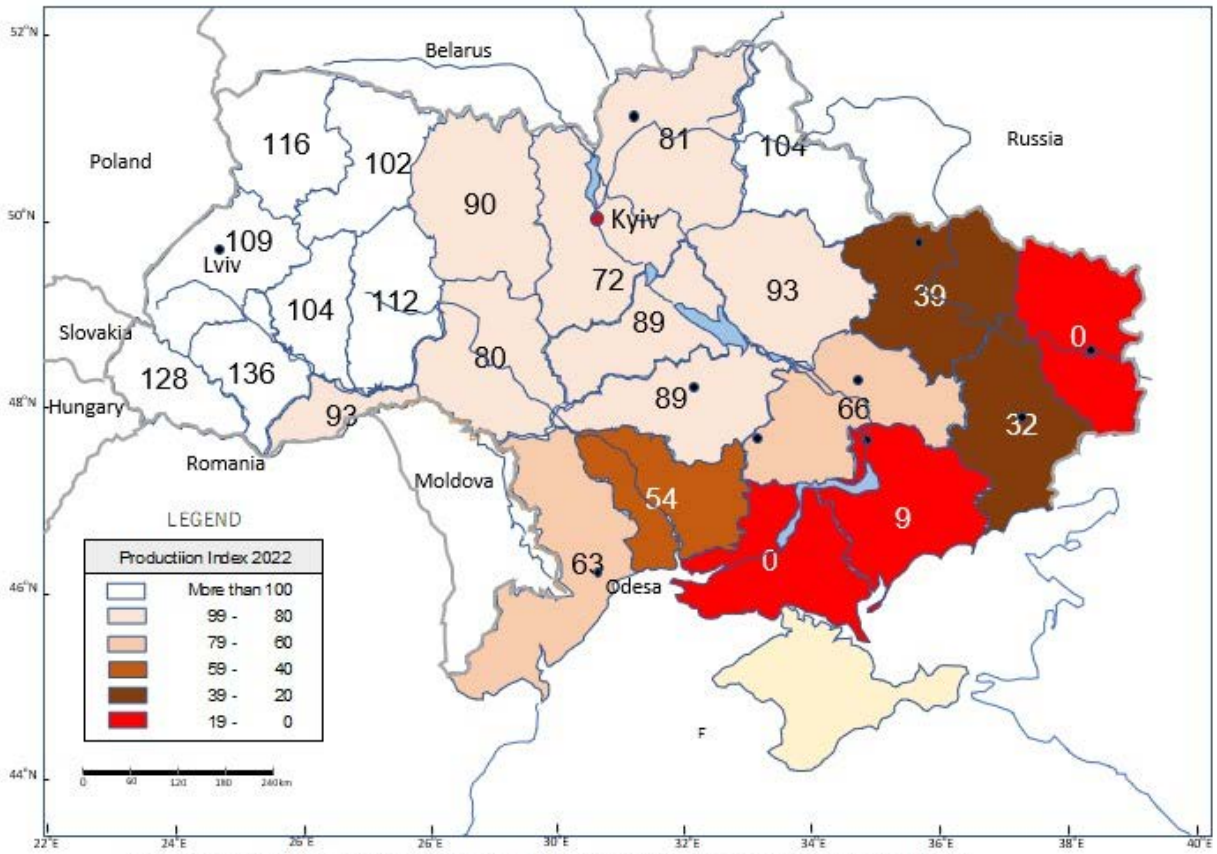
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 1.1 Wheat Production by Oblast in 2021



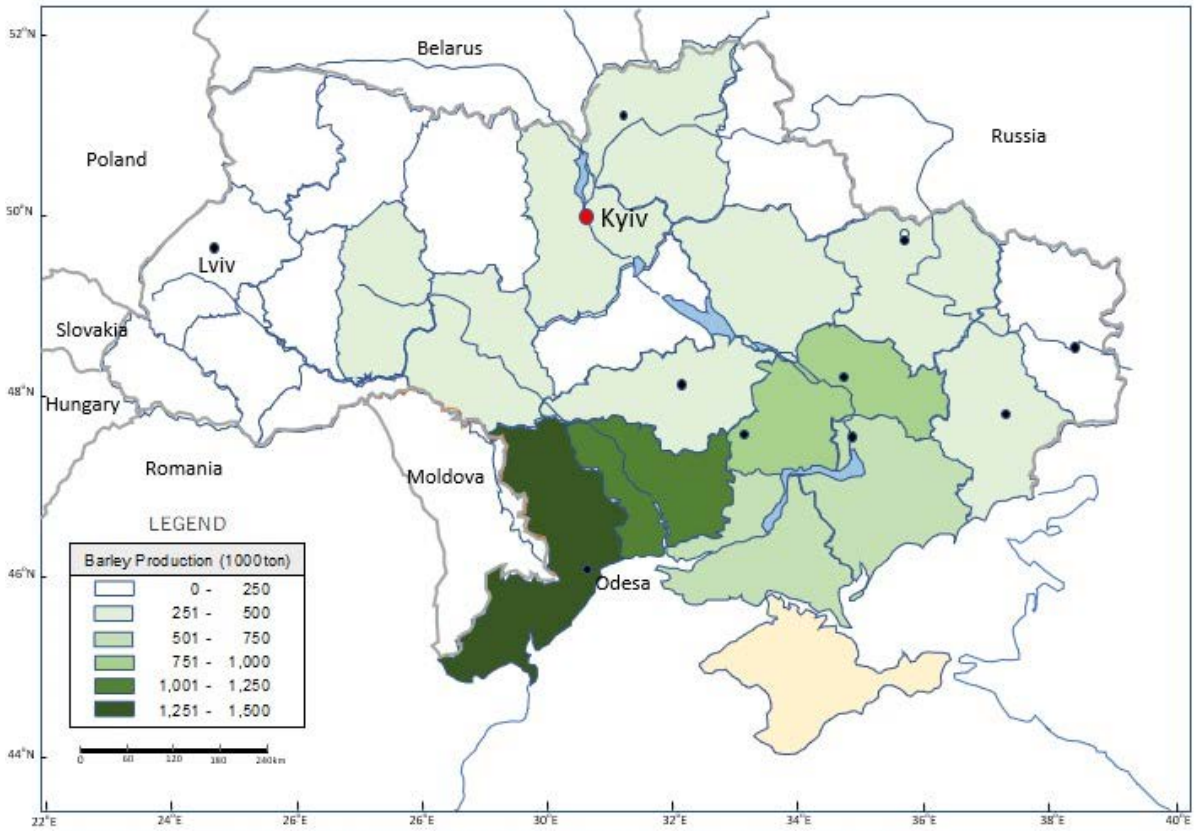
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 1.2 Wheat Production by Oblast in 2022 (estimated)



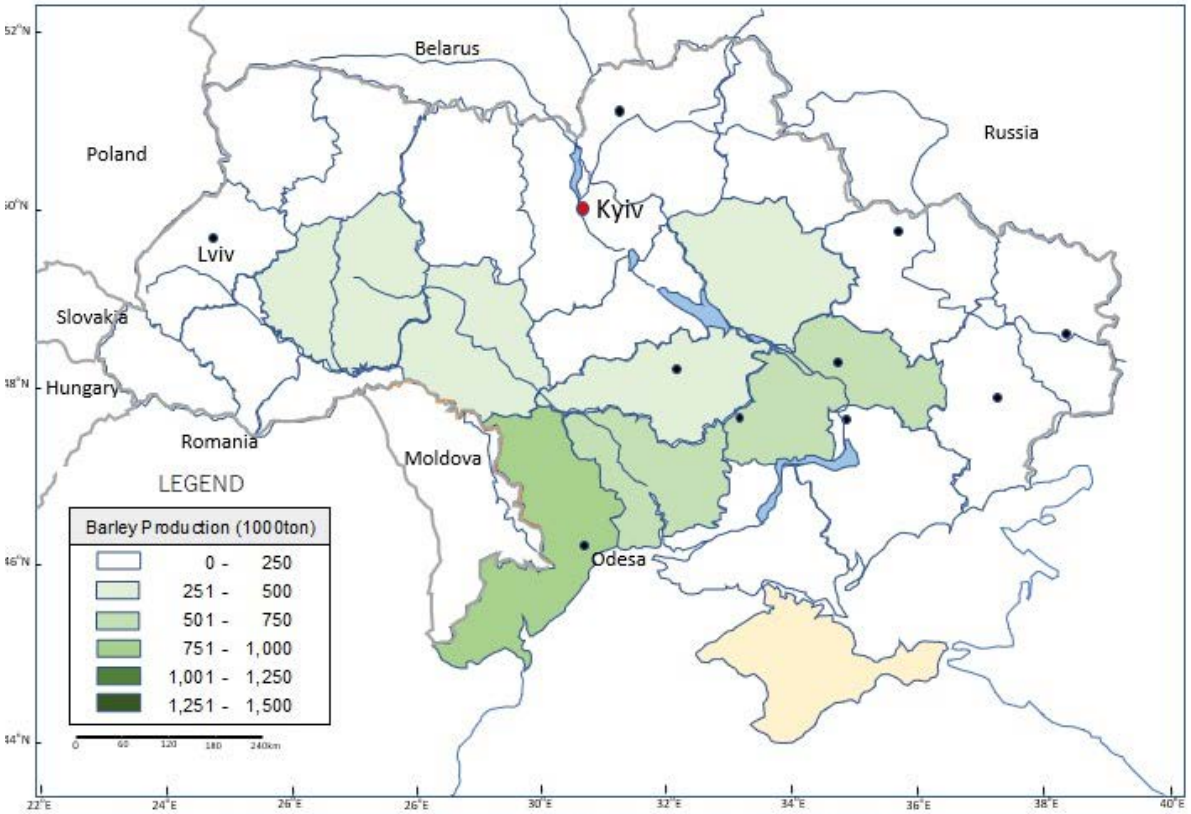
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 1.3 Production Index of Wheat in 2022 against 2021



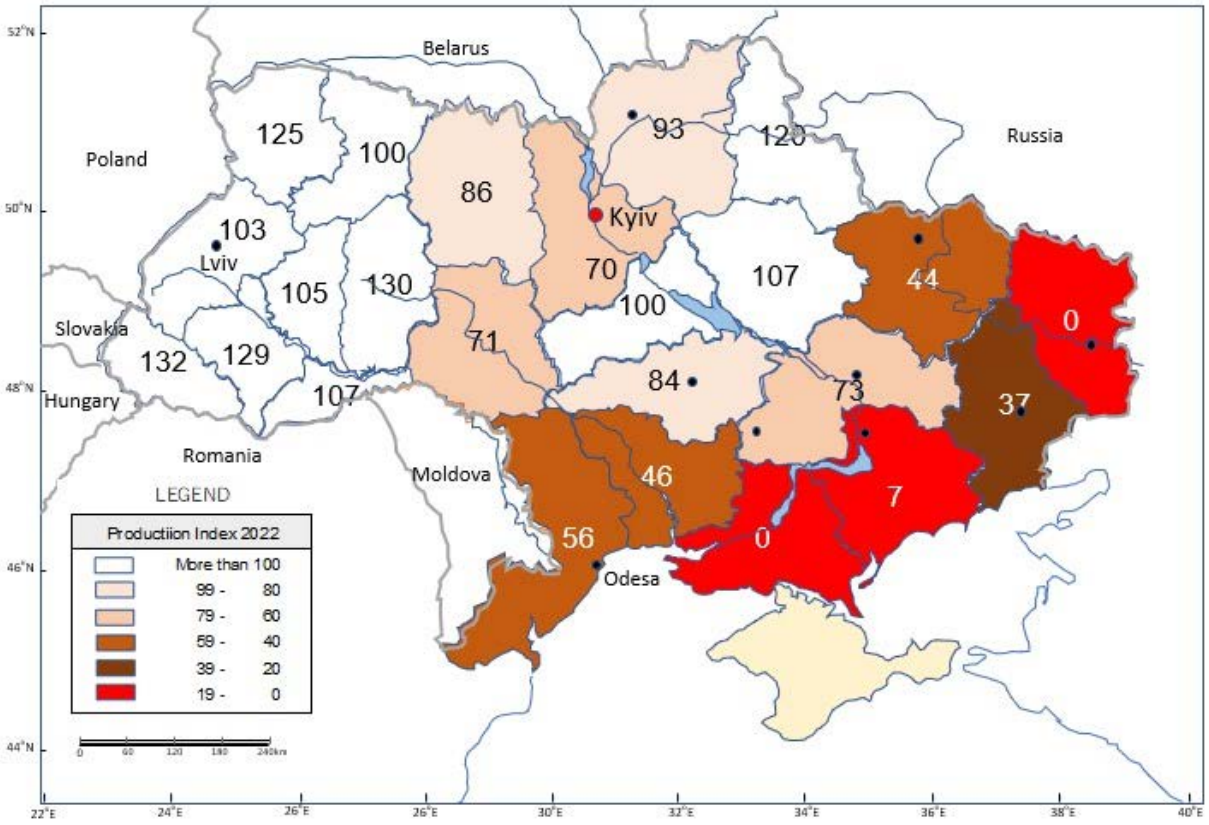
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 2.1 Barley Production by Oblast in 2021



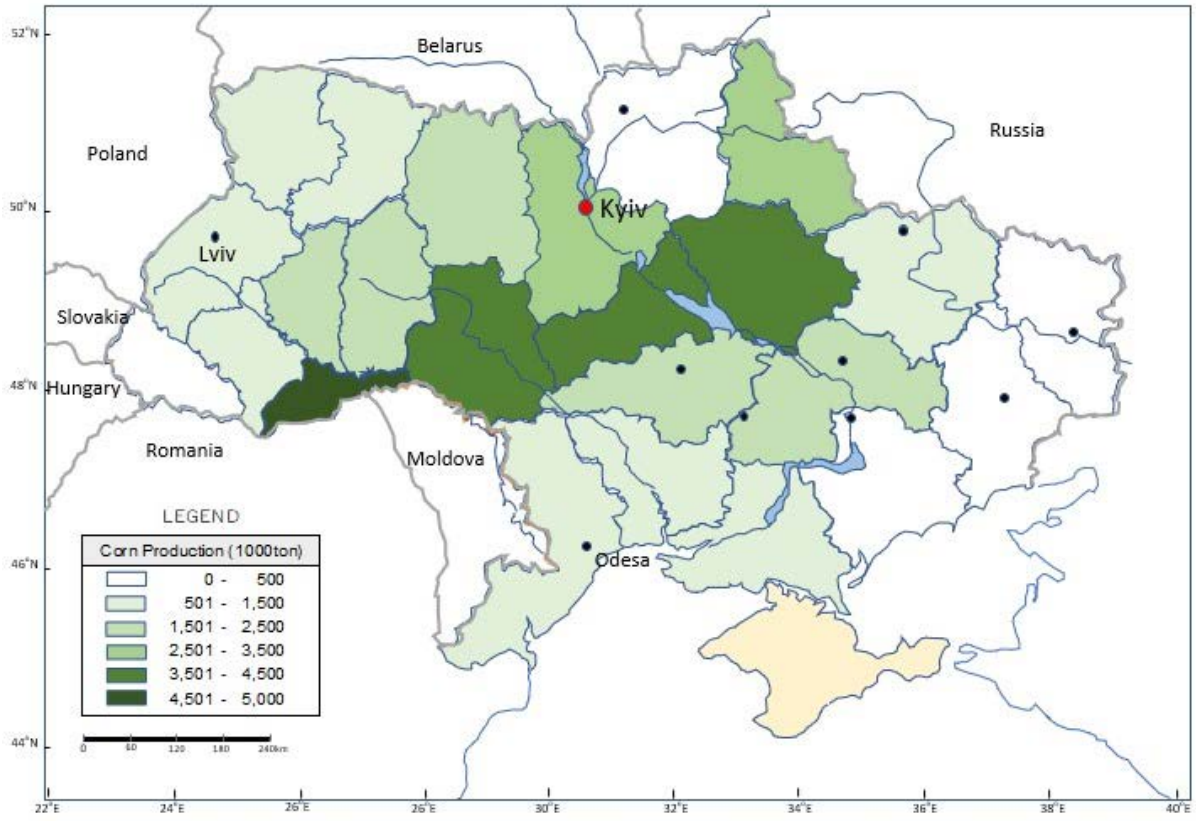
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 2.1 Barley Production by Oblast in 2022 (estimated)



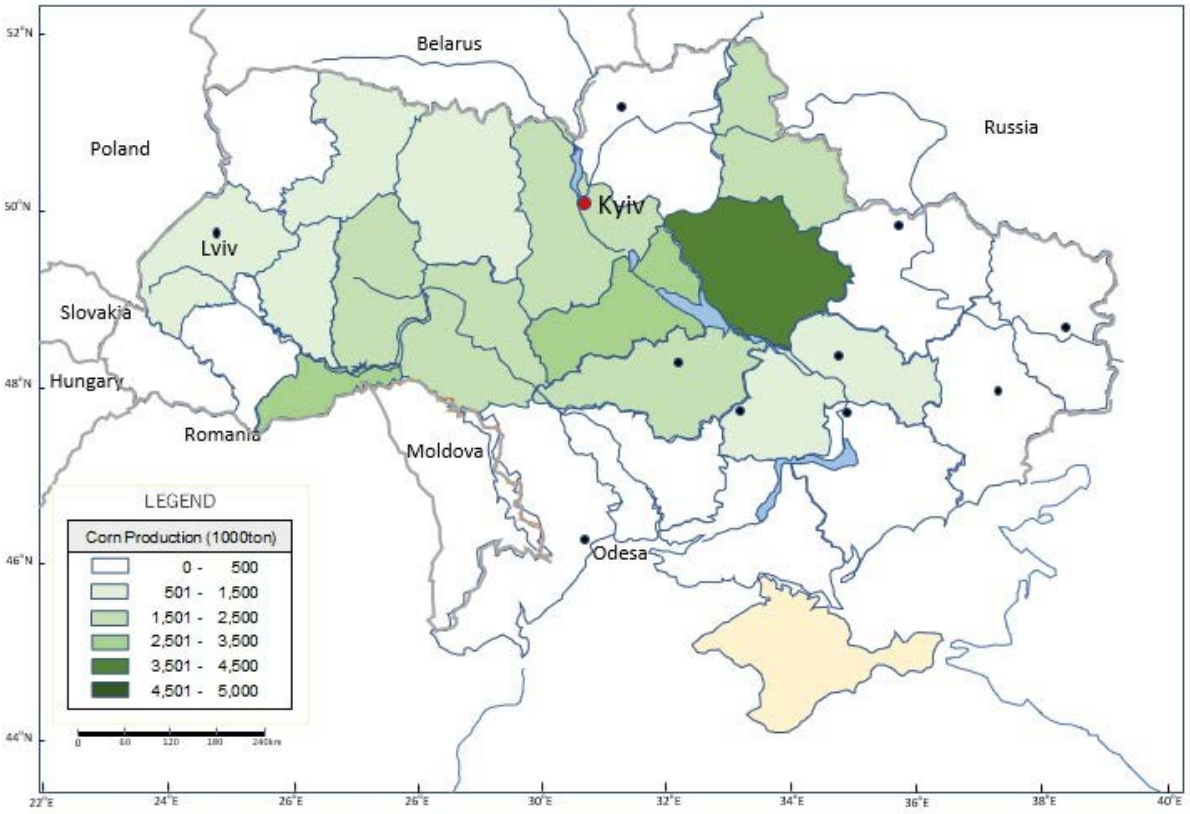
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 2.3 Production Index of Barley in 2022 against 2021



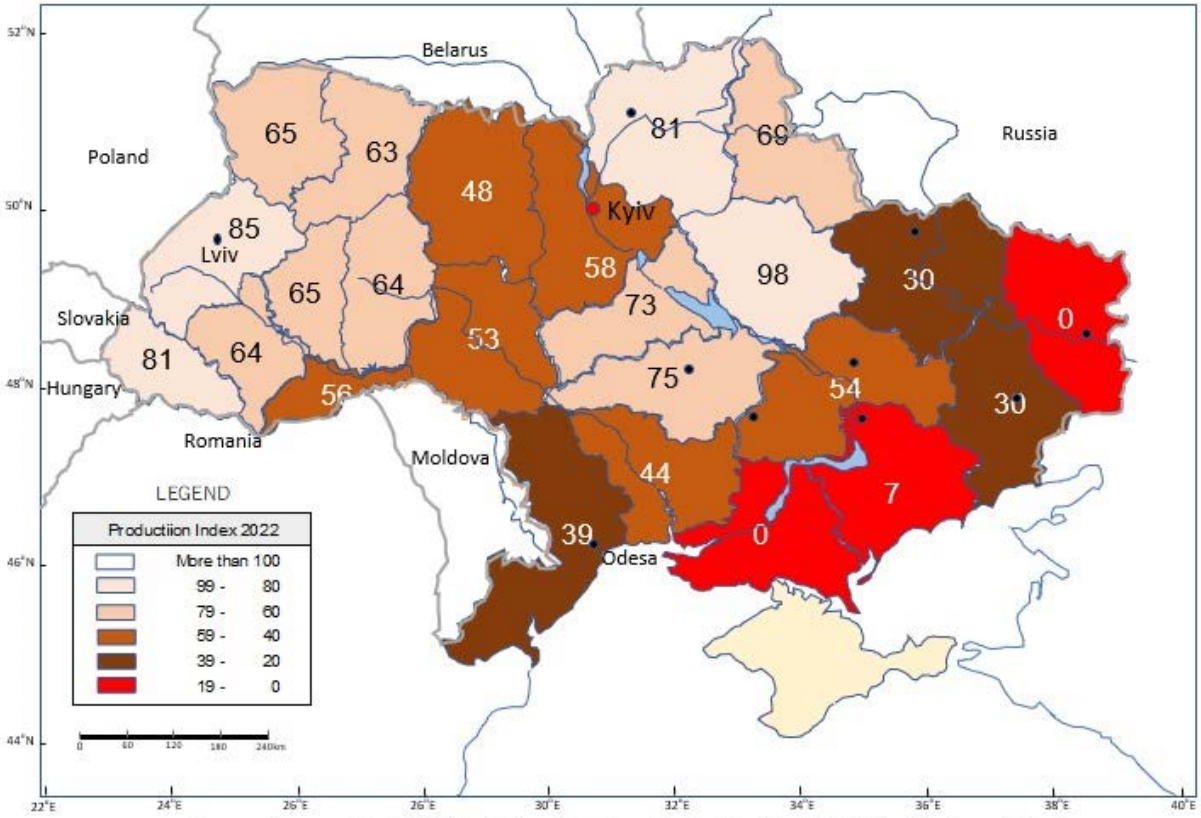
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 3.1 Corn Production by Oblast in 2021



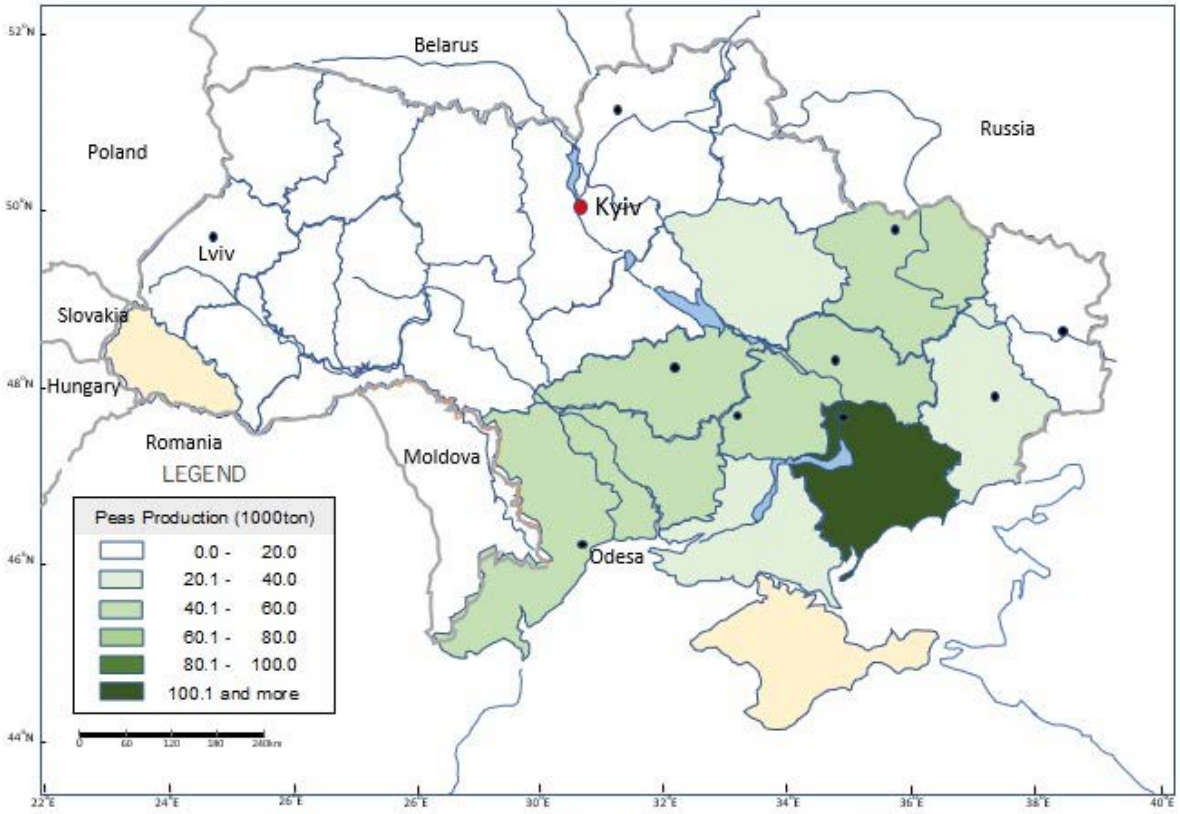
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 3.2 Corn Production by Oblast in 2022 (estimated)



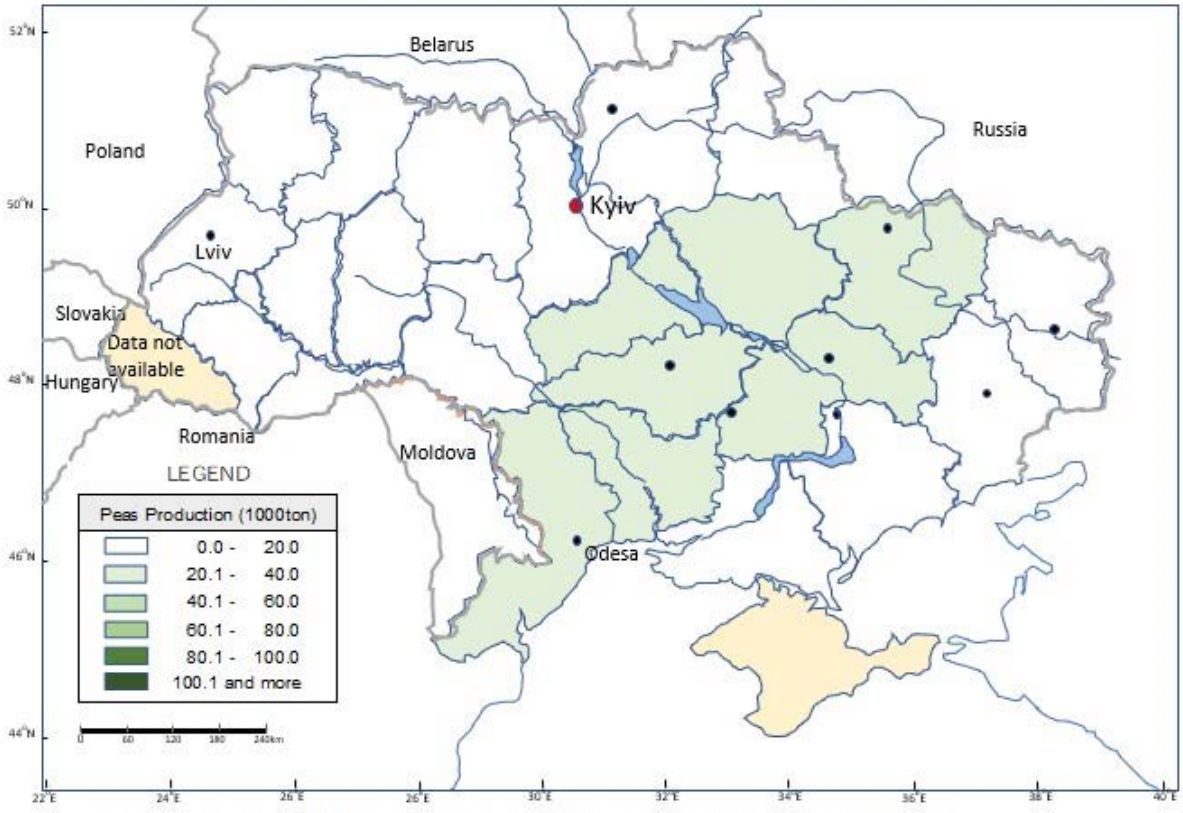
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 3.3 Production Index of Corn in 2022 against 2021



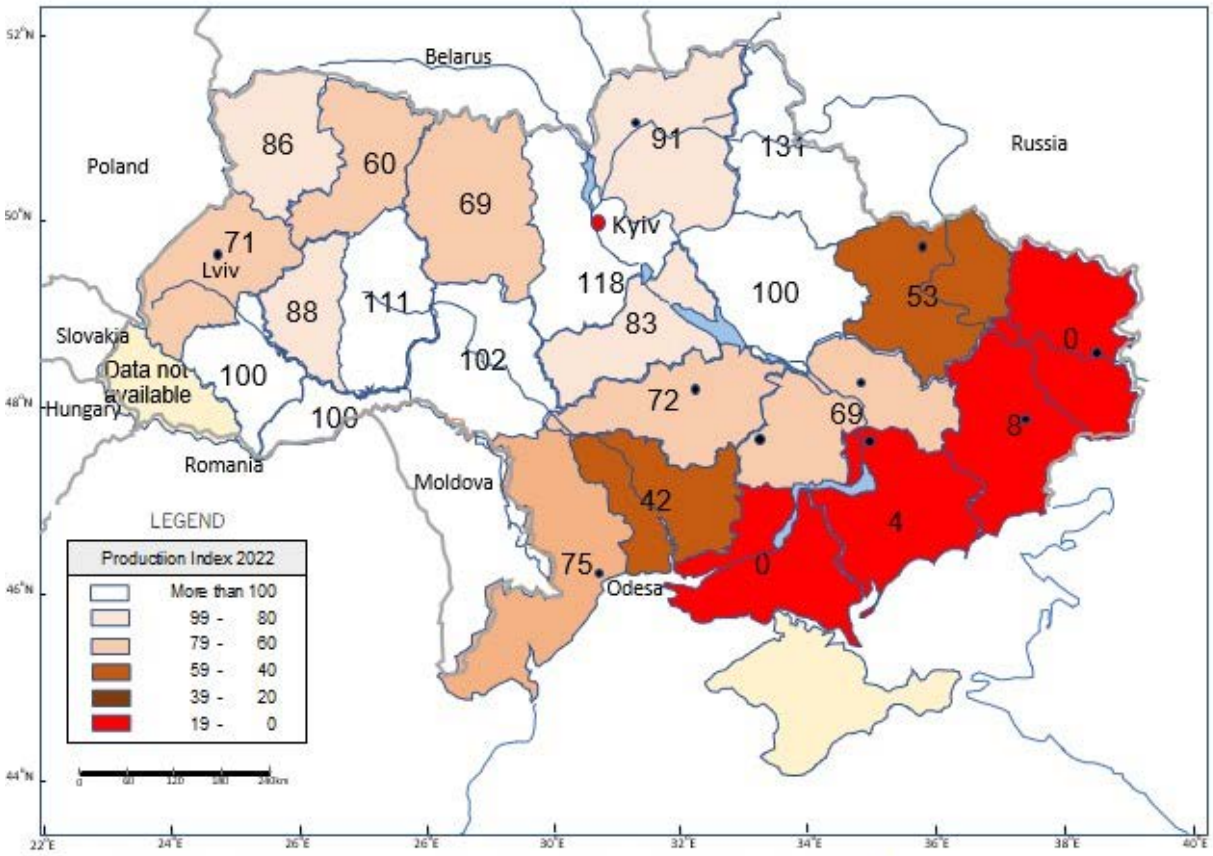
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 4.1 Peas Production by Oblast in 2021



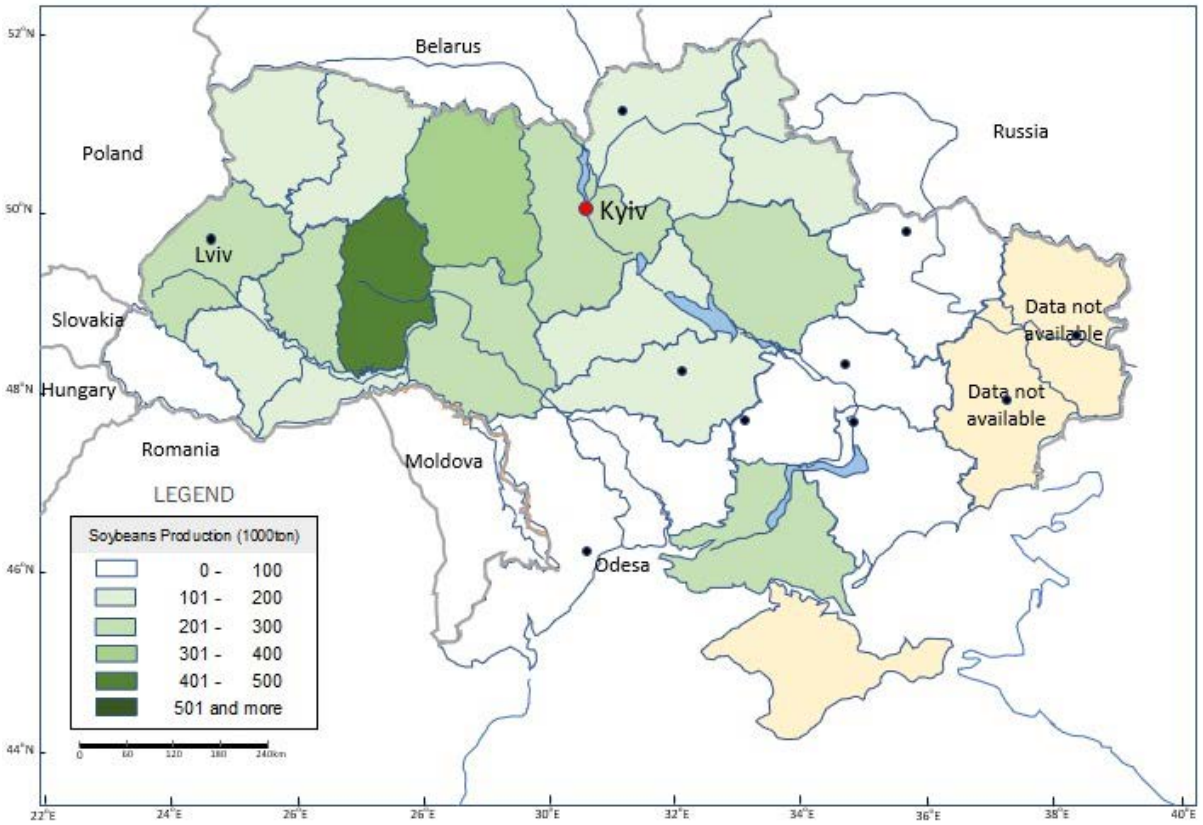
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 4.2 Peas Production by Oblast in 2022



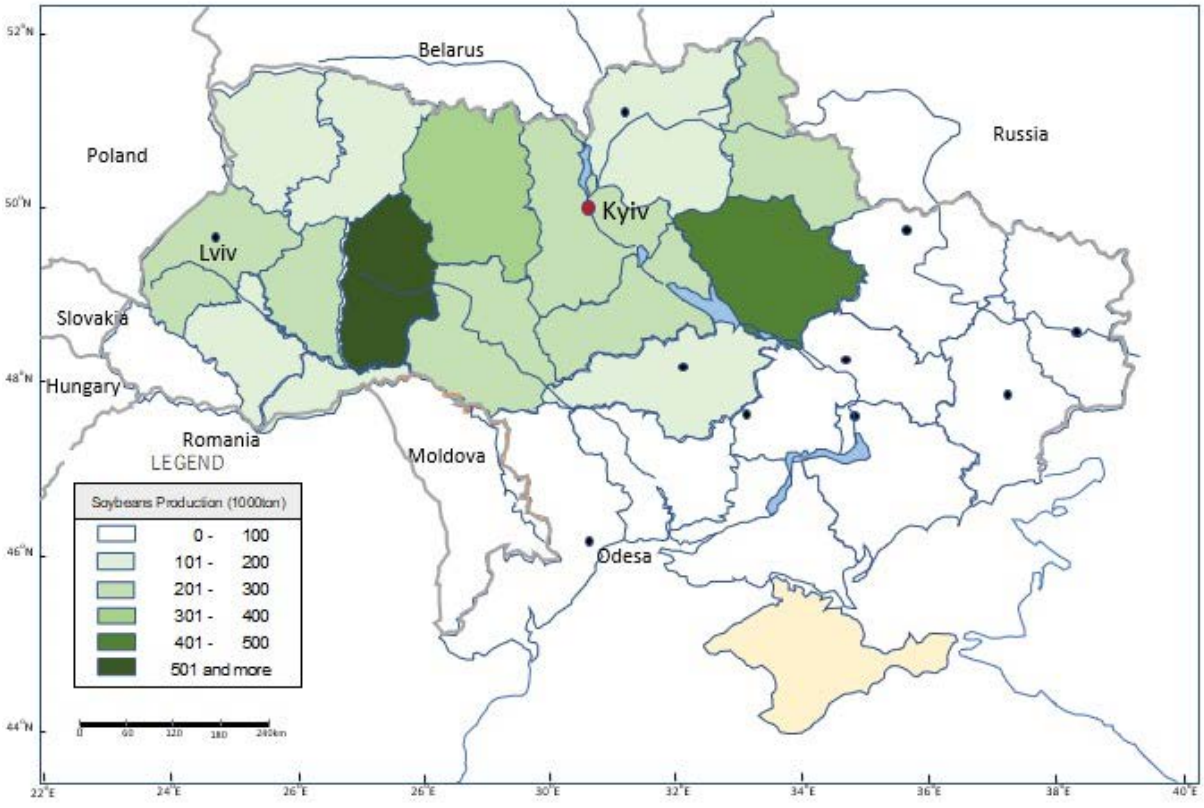
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 4.3 Production Index of Peas in 2022 against 2021



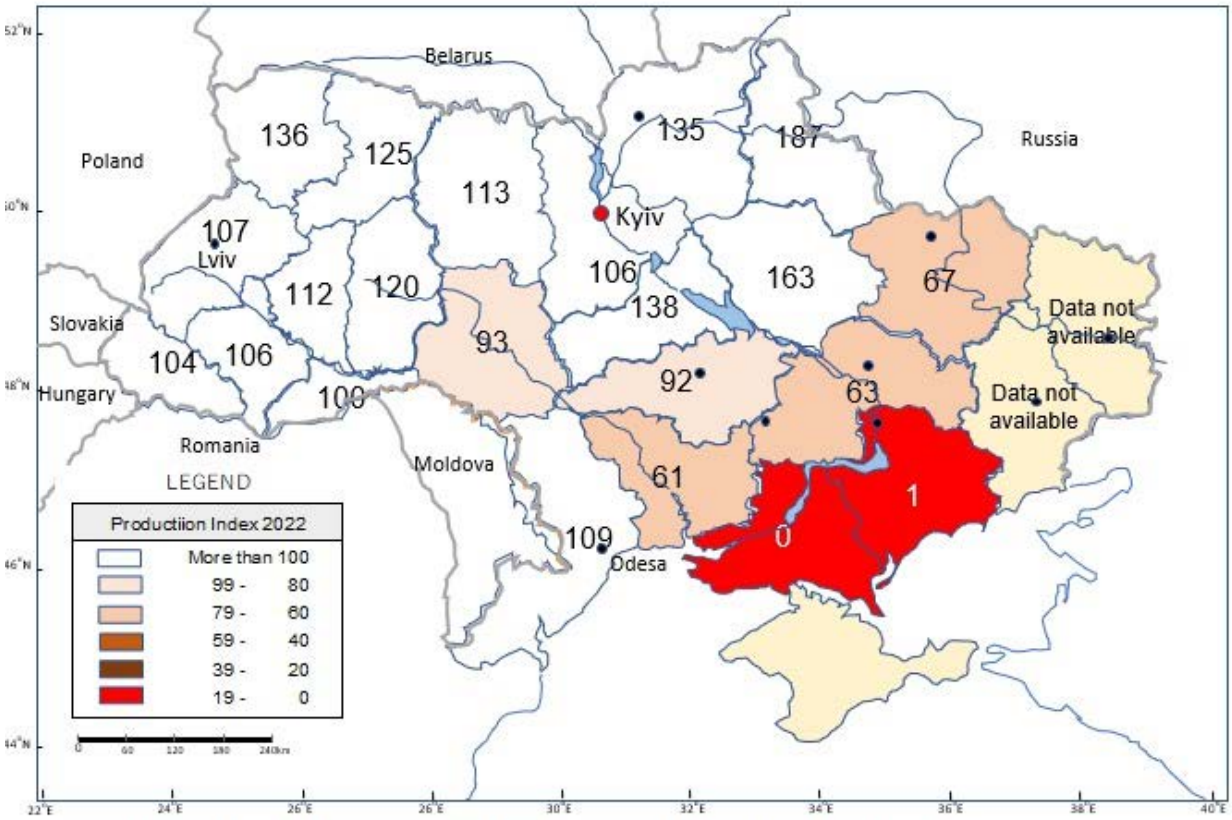
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 5.1 Soybeans Production by Oblast in 2021



Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 5.2 Soybeans Production by Oblast in 2022



Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 5.3 Production Index of Soybeans in 2022 against 2021

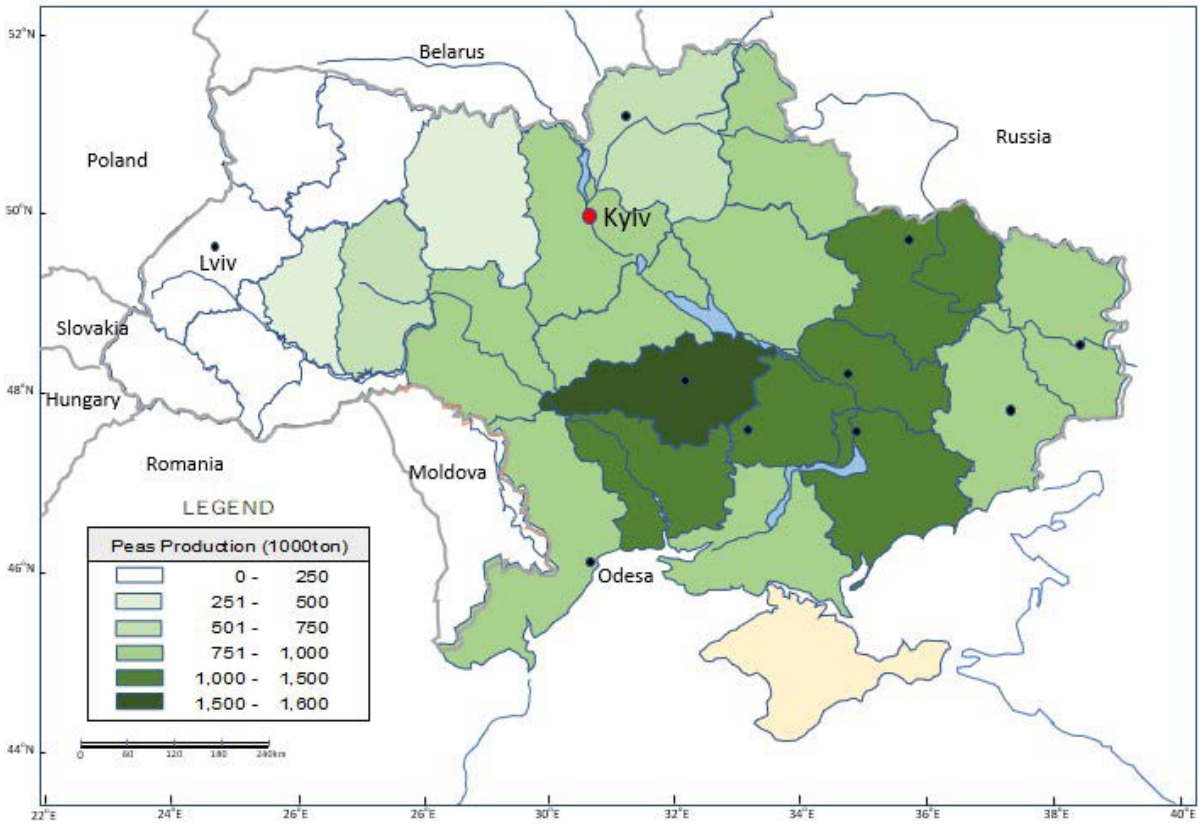
Annex 2.3.2

Crop Production Charts by Oblast in 2021 and 2022 (Oil seeds and Sugar Beet)

Annex 2.3.2 Crop Production Charts by Oblast in 2021 and 2022 (Oil Seeds and Sugar Beet)

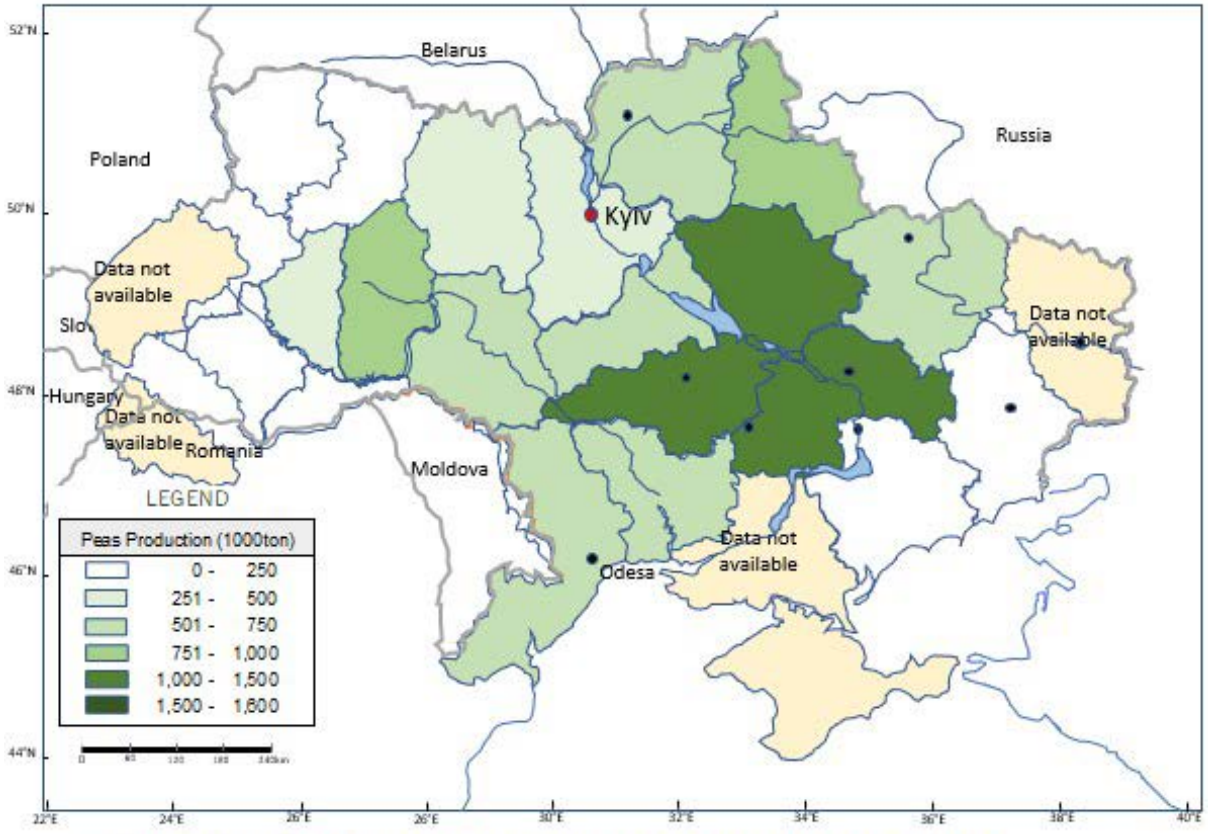
Crop Production Charts by Oblast in 2021 and 2022

Section II : Oil Seeds and Sugar Beet



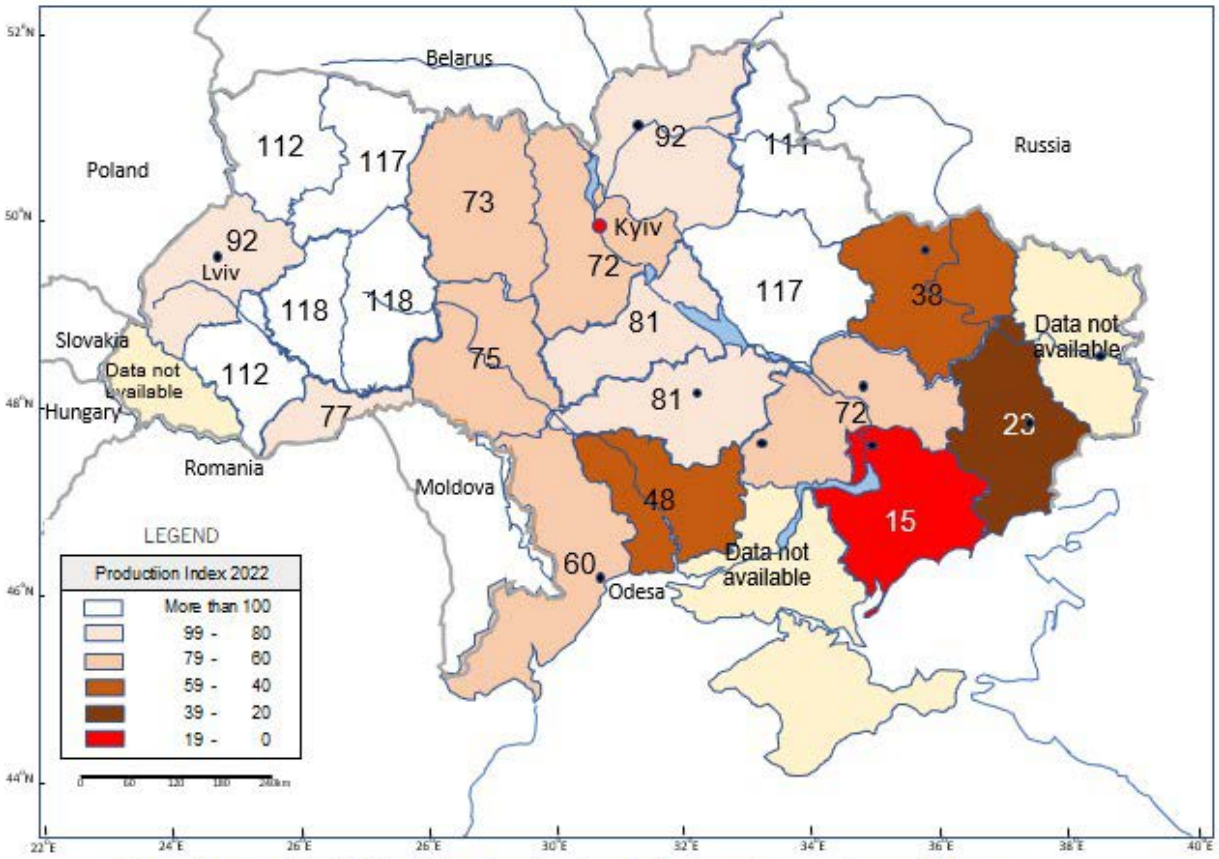
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 6.1 Sunflower Production by Oblast in 2021



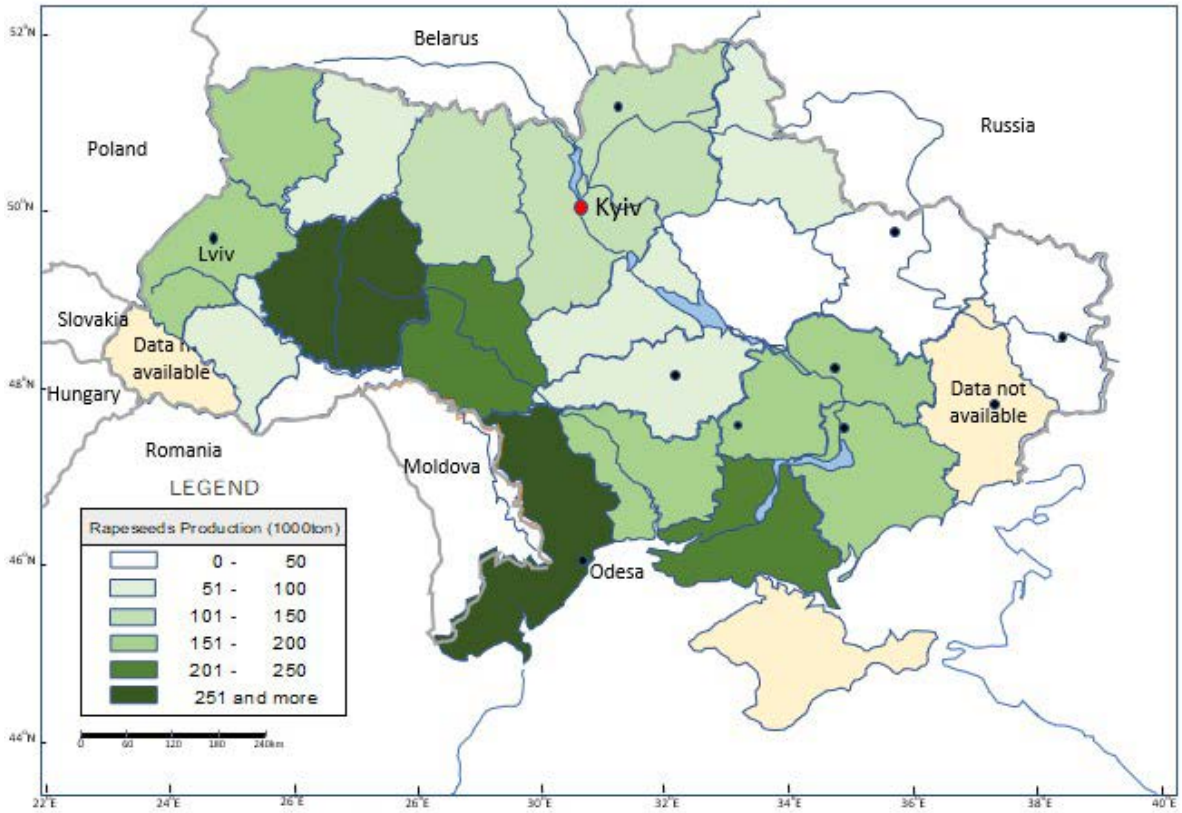
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 6.2 Sunflower Production by Oblast in 2022



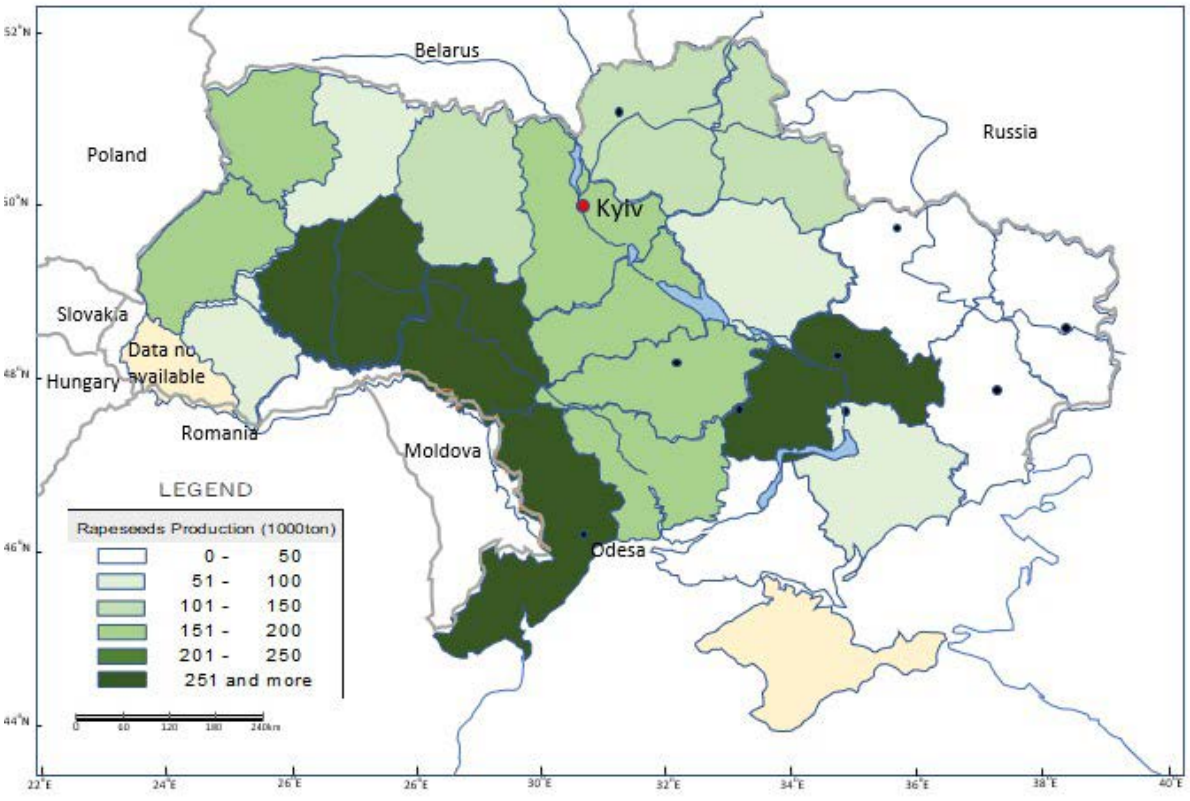
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 6.3 Production Index of Sunflower in 2022 against 2021



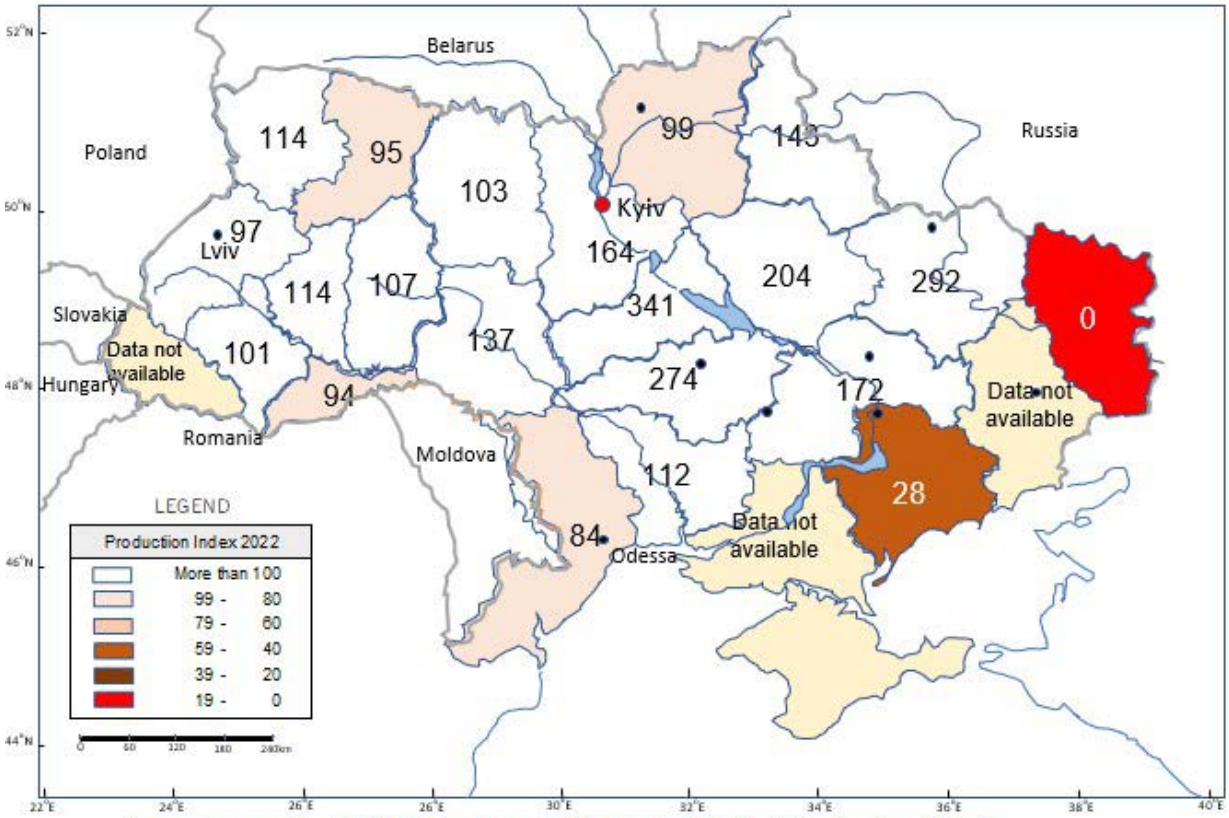
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 7.1 Rapeseeds Production by Oblast in 2021



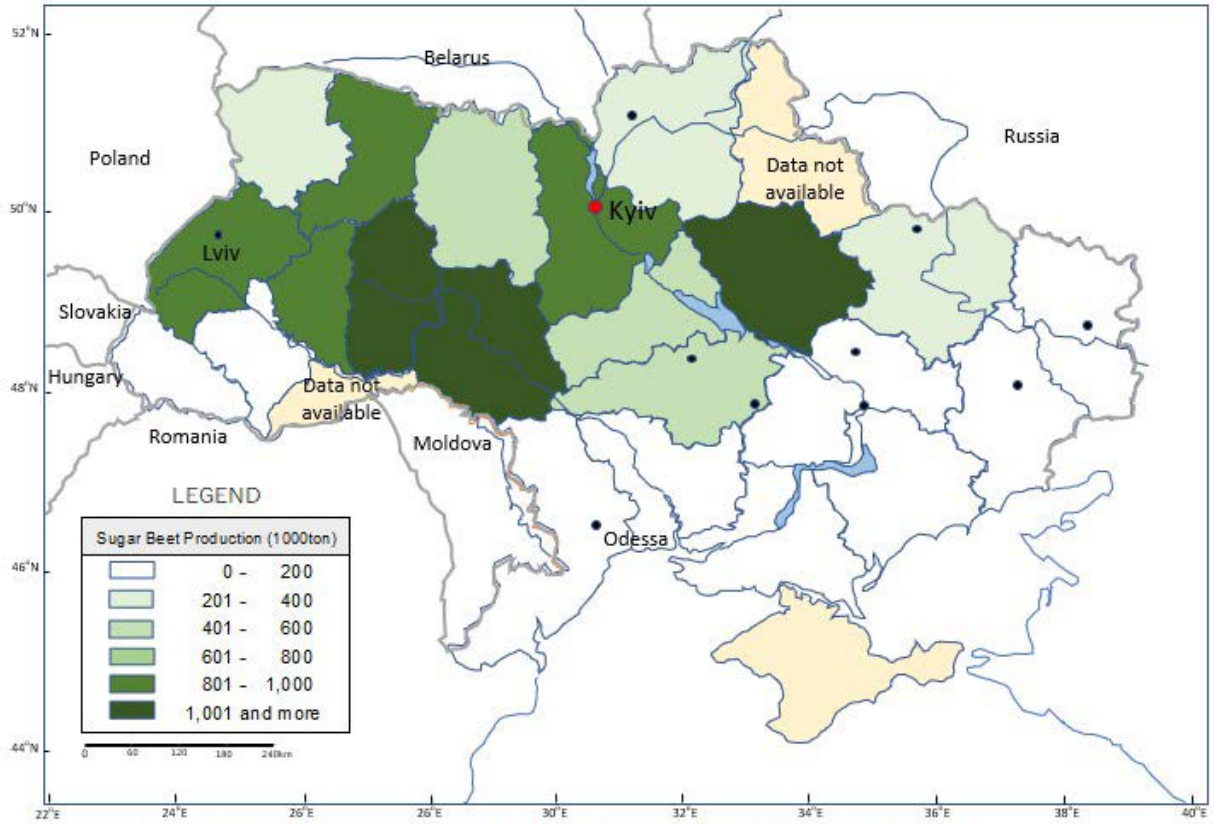
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 7.2 Rapeseeds Production by Oblast in 2022



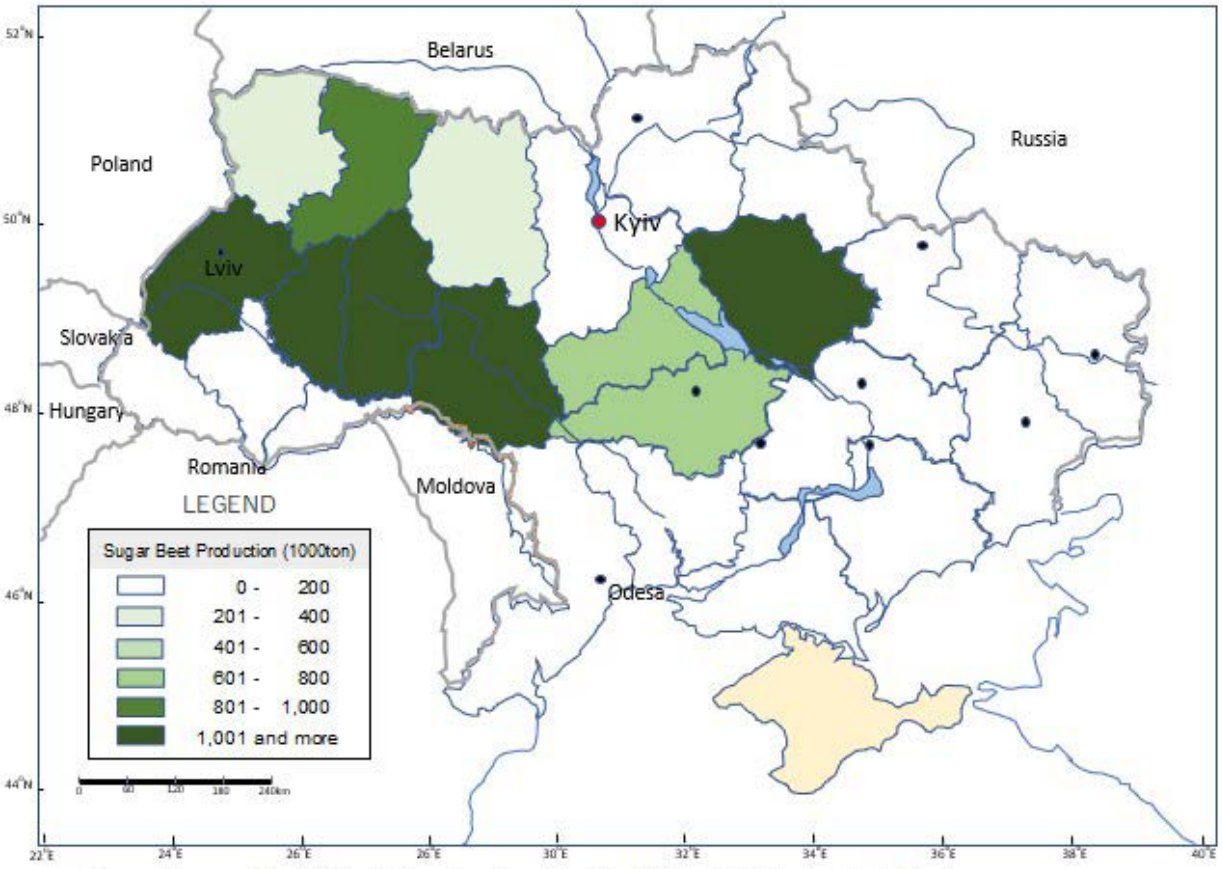
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 7.3 Production Index of Rapeseeds in 2022 against 2021



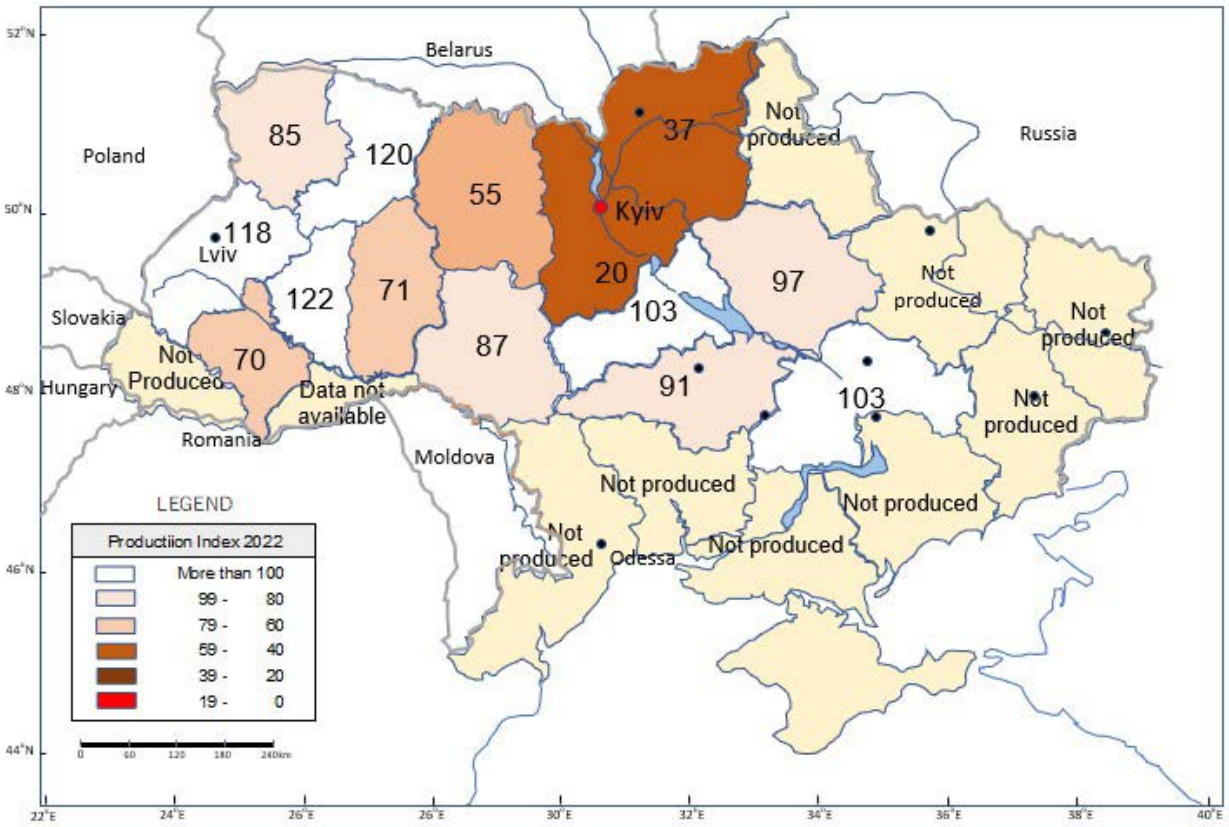
Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 8.1 Sugar Beet Production by Oblast in 2021



Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 8.2 Sugar Beet Production by Oblast in 2022



Source: Processed by JICA Study Team based on the data by State Statistics Service of Ukraine

Figure 8.3 Production Index of Sugar Beet in 2022 against 2021

Annex 2.3.3

Crop Production Charts by Oblast in 2021 (Vegetables)

Annex 2.3.3 Crop Production Charts by Oblast in 2021 (Vegetables)

Crop Production Charts by Oblast in 2021

Section III : Vegetables

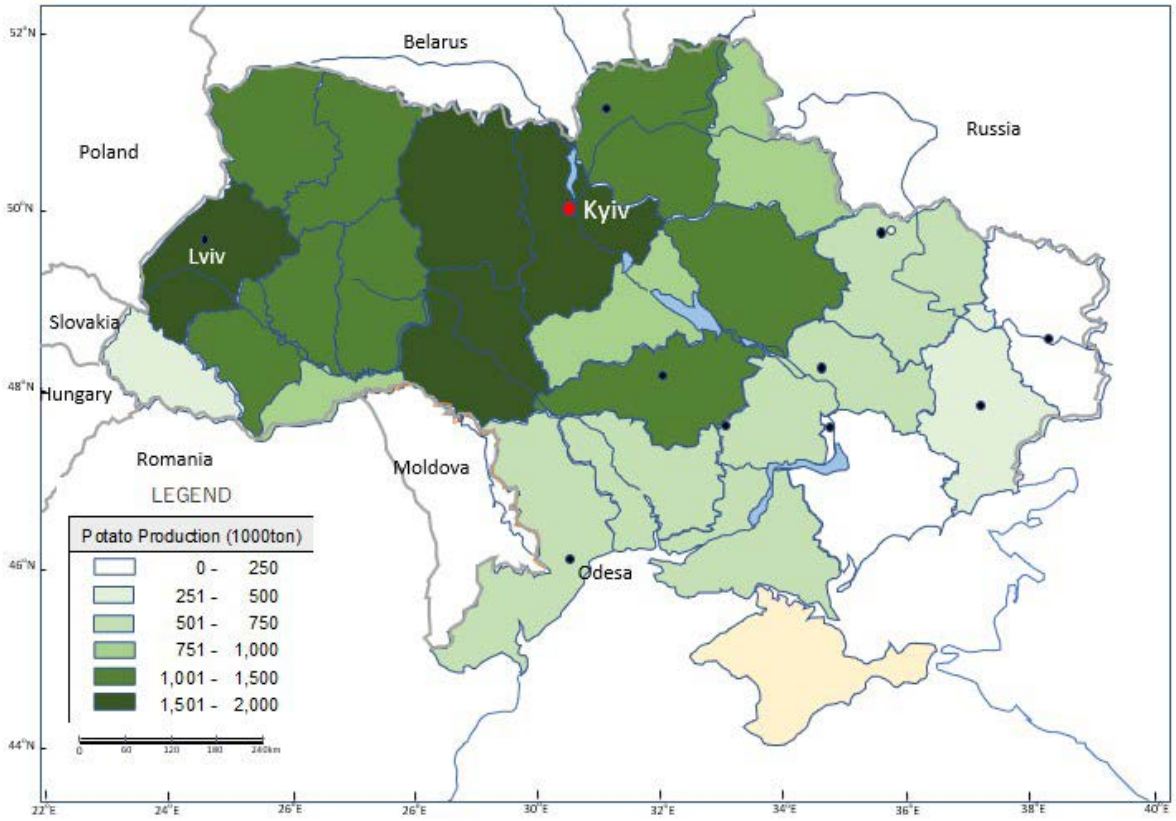


Figure 4.1 Potato Production by Oblast in 2021

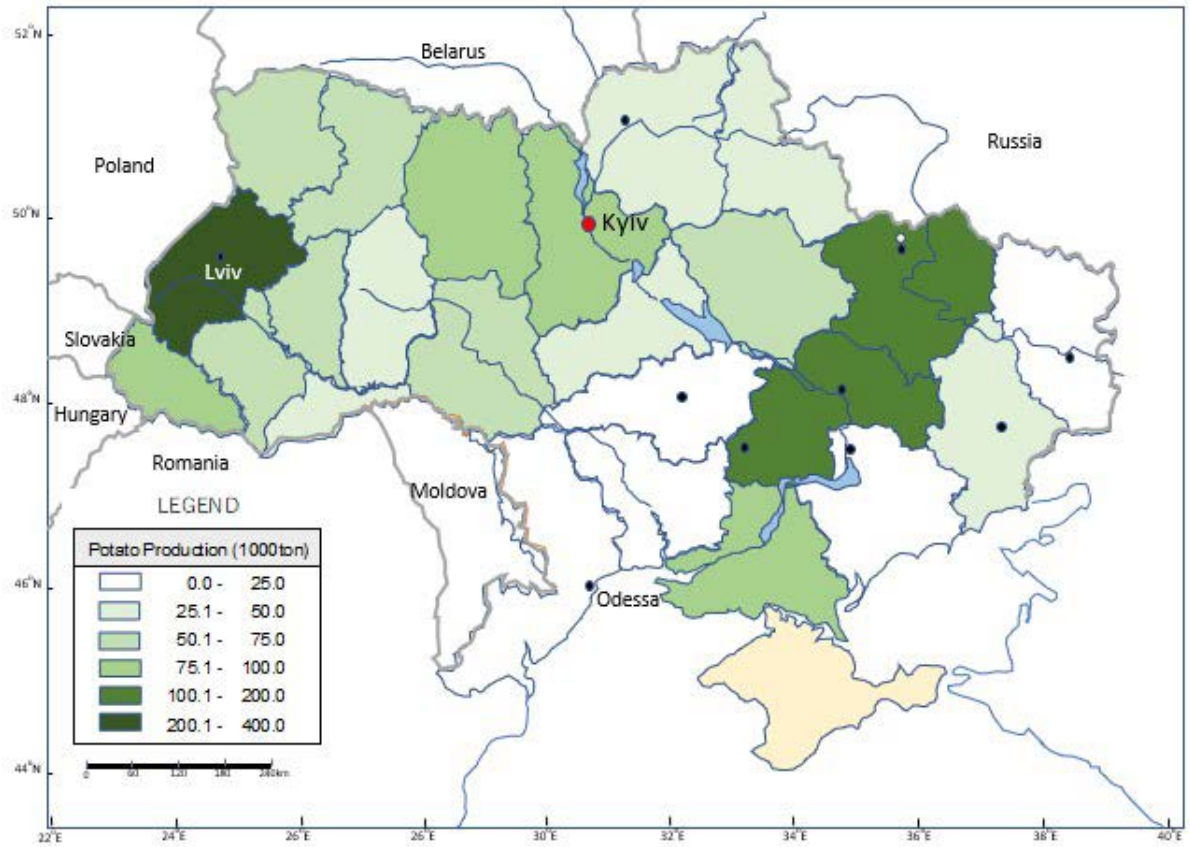


Figure 10.1 Cabbage Production by Oblast in 2021

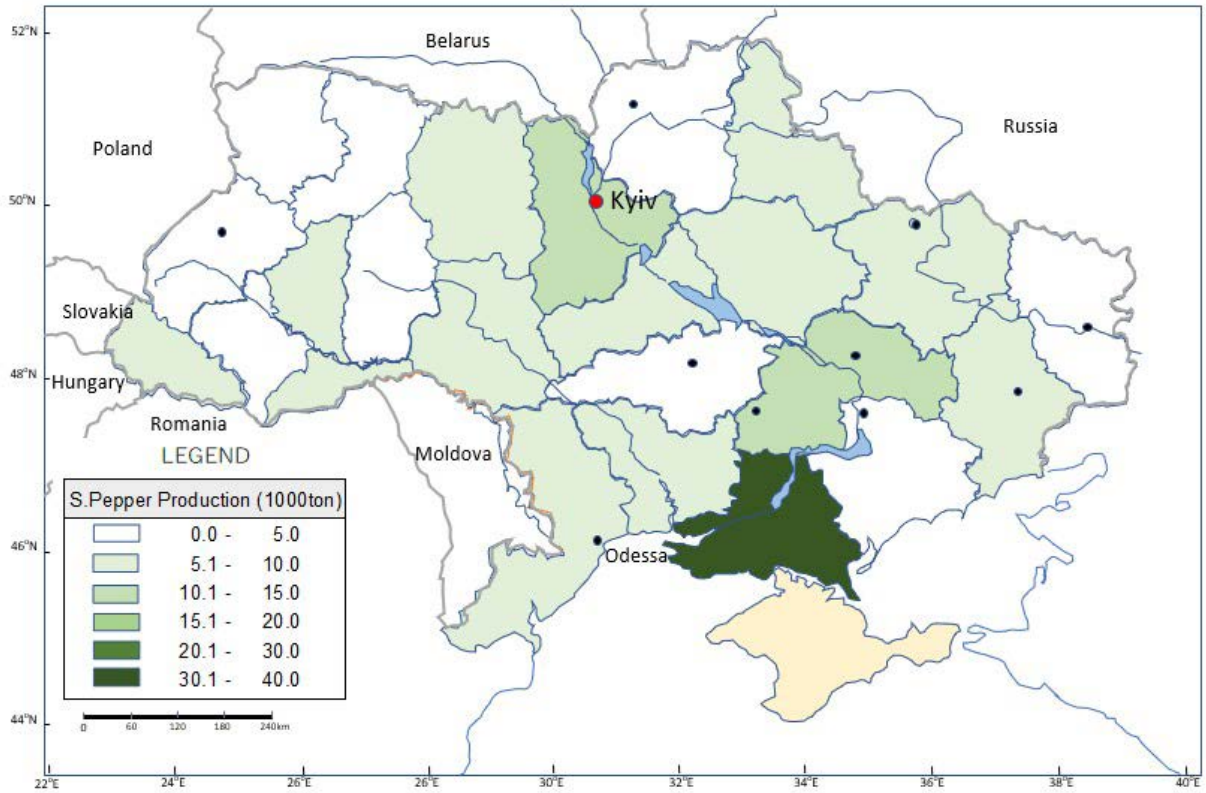


Figure 11.1 Sweet Pepper Production by Oblast in 2021

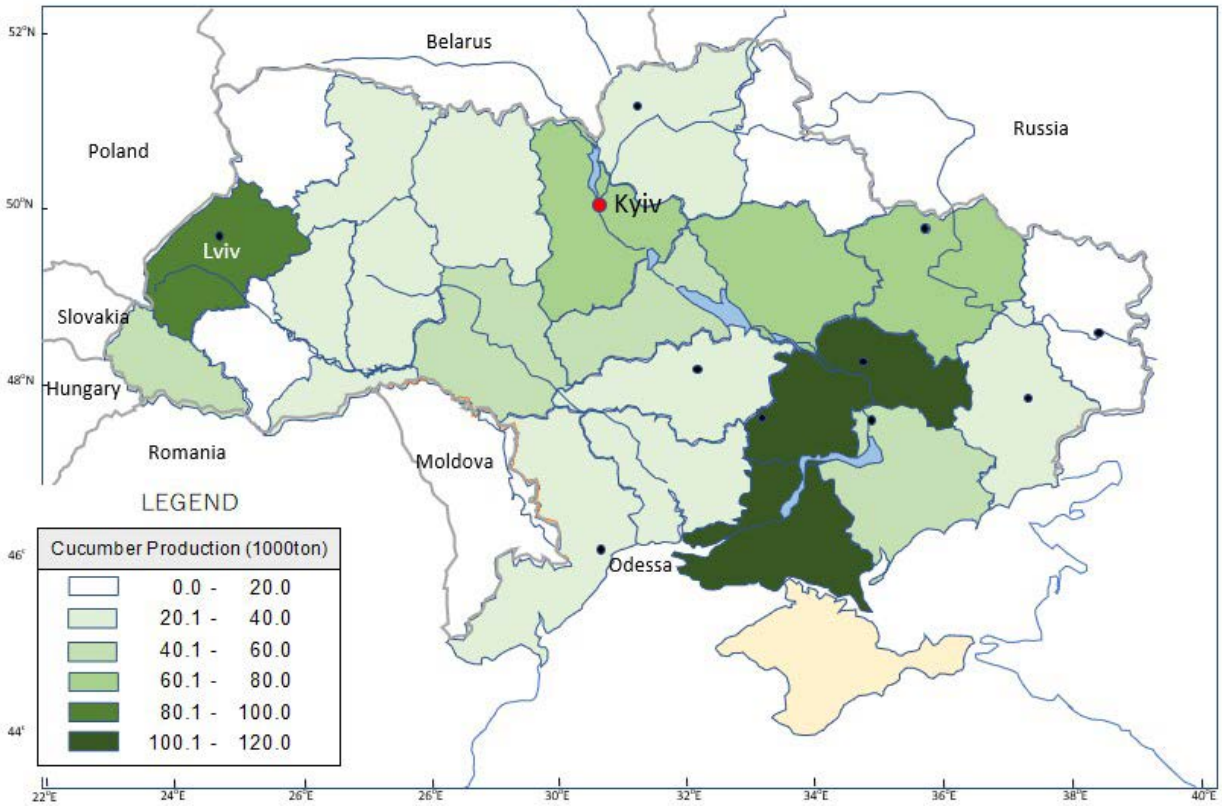


Figure 12.1 Cucumbers and Gherkins Production by Oblast in 2021

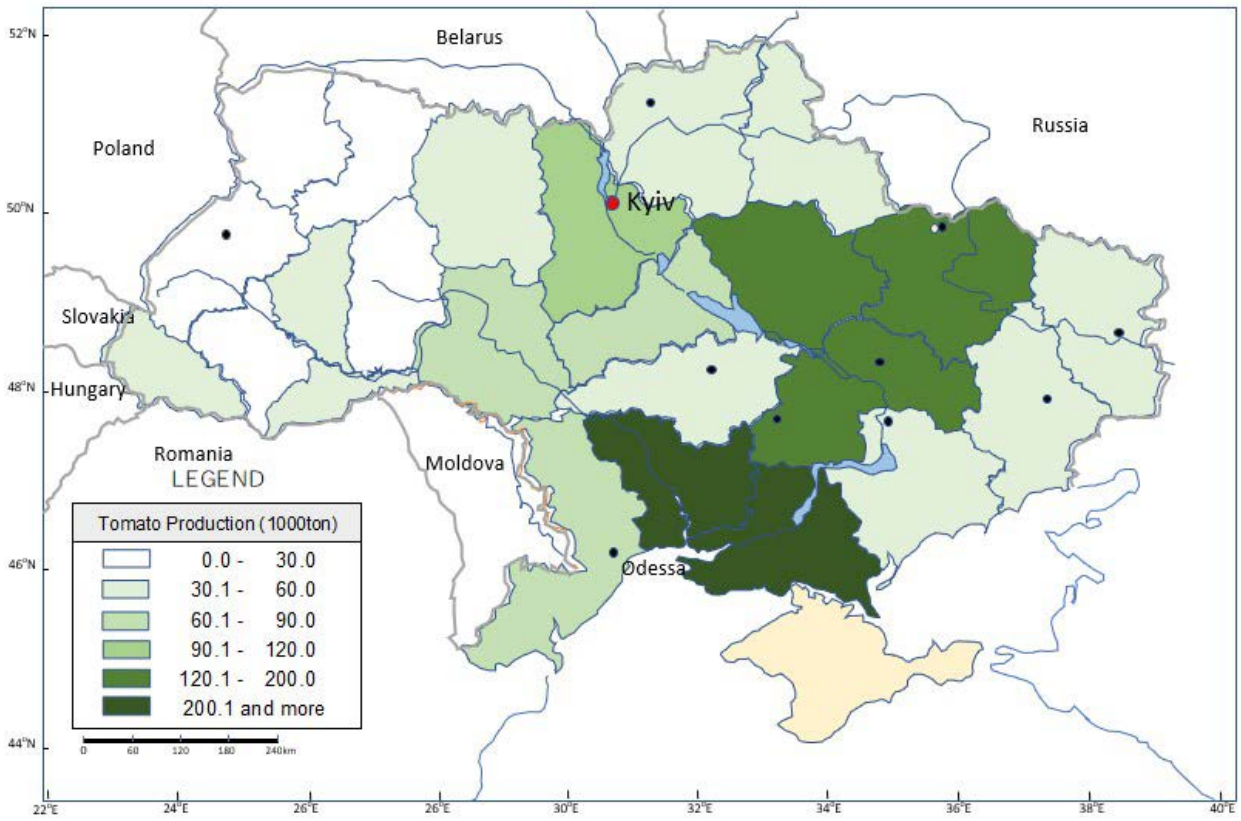


Figure 13.1 Tomato Production by Oblast in 2021

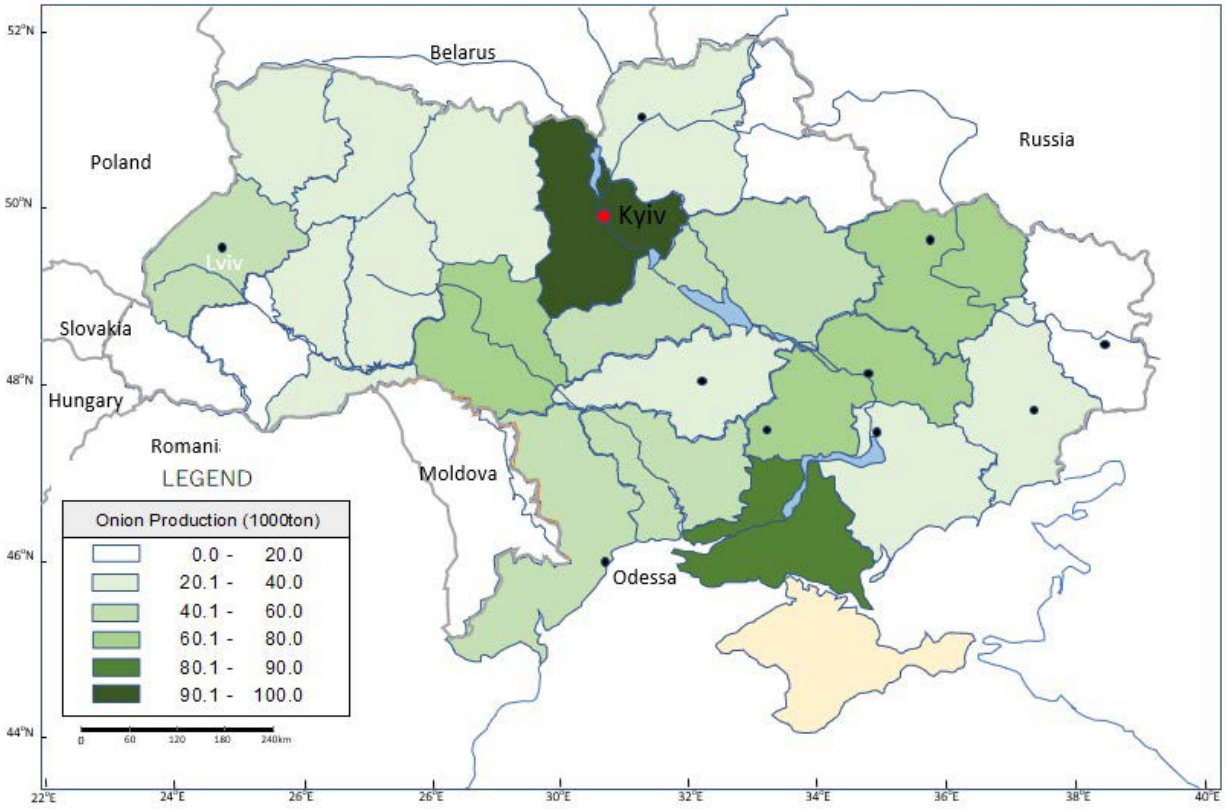


Figure 14.1 Onion Production by Oblast in 2021

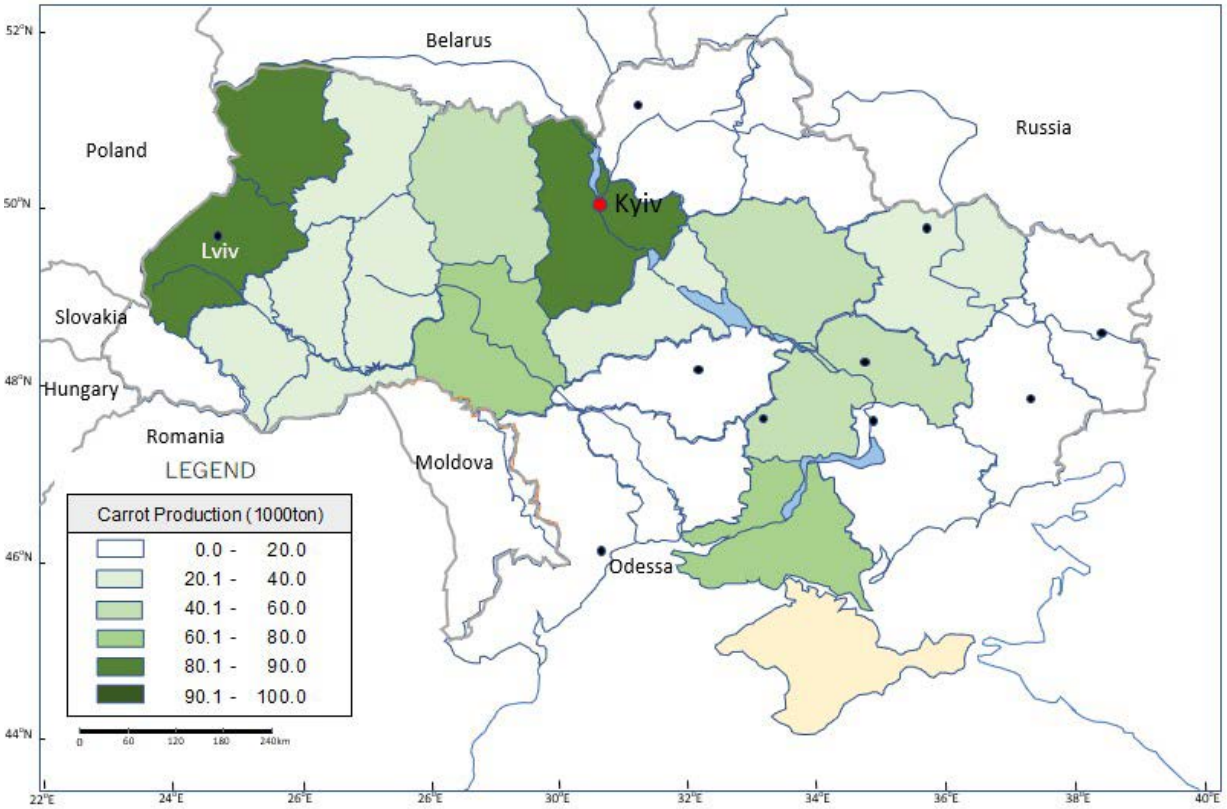


Figure 15.1 Carrot Production by Oblast in 2021

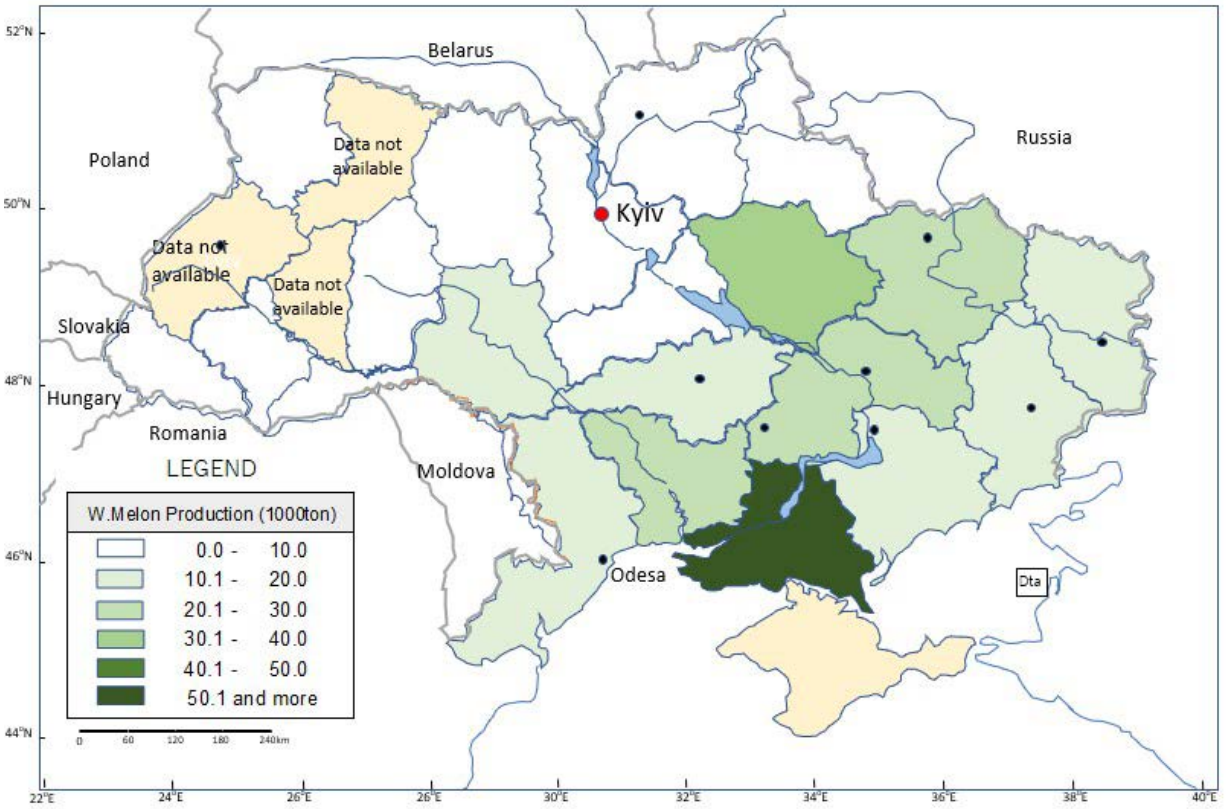


Figure 16.1 Water Melon Production by Oblast in 2021

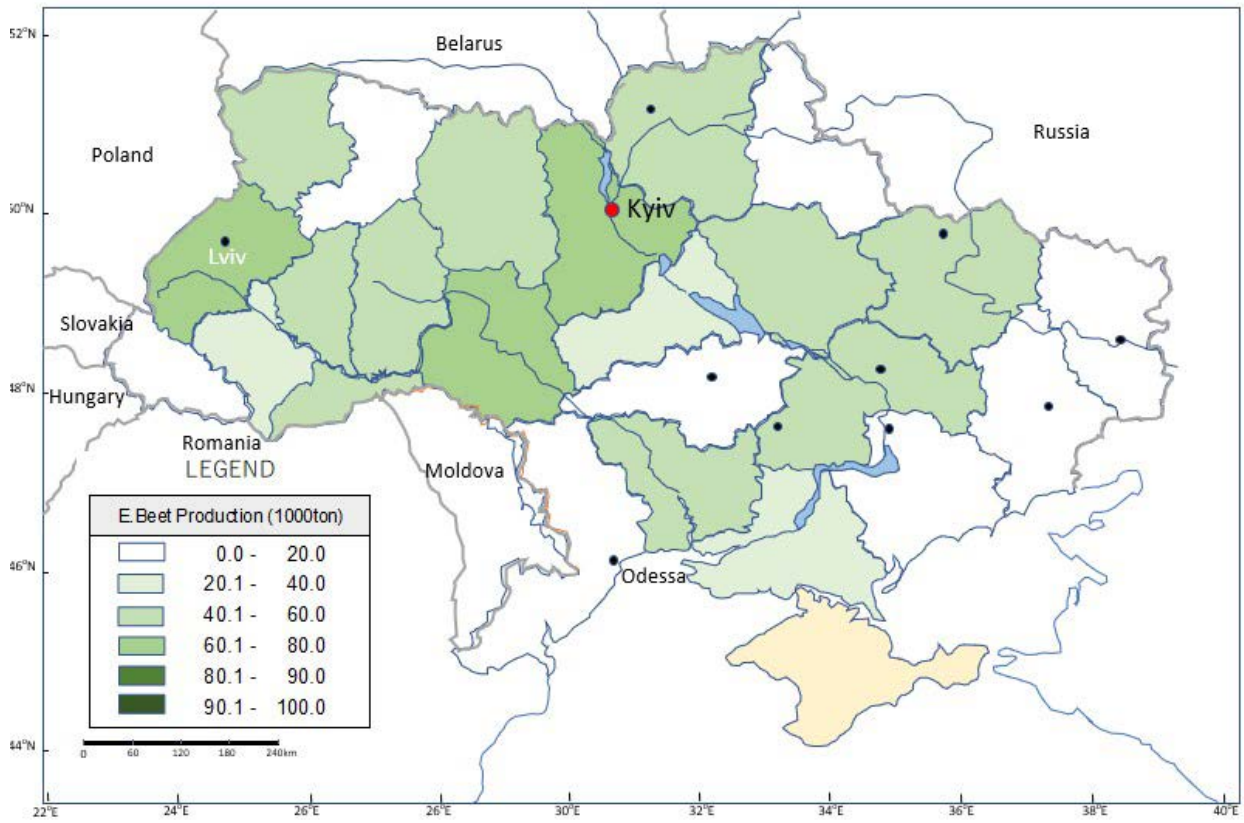


Figure 17.1 Edible Beet Production by Oblast in 2021

Annex 2.3.4

Crop Production Charts by Oblast in 2021 (Fruits)

Annex 2.3.4 Crop Production Charts by Oblast in 2021 (Fruits)

Crop Production Charts by Oblast in 2021

Section IV : Fruits

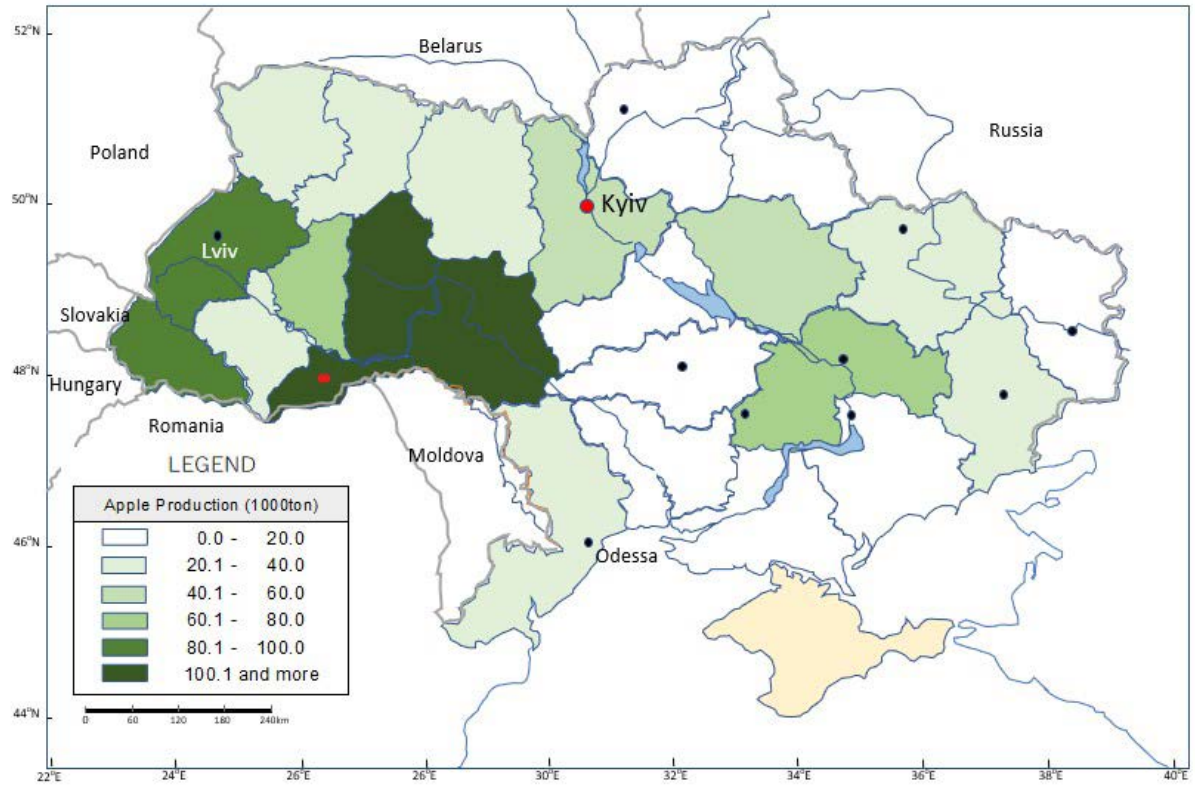


Figure 18.1 Apple Production by Oblast in 2021

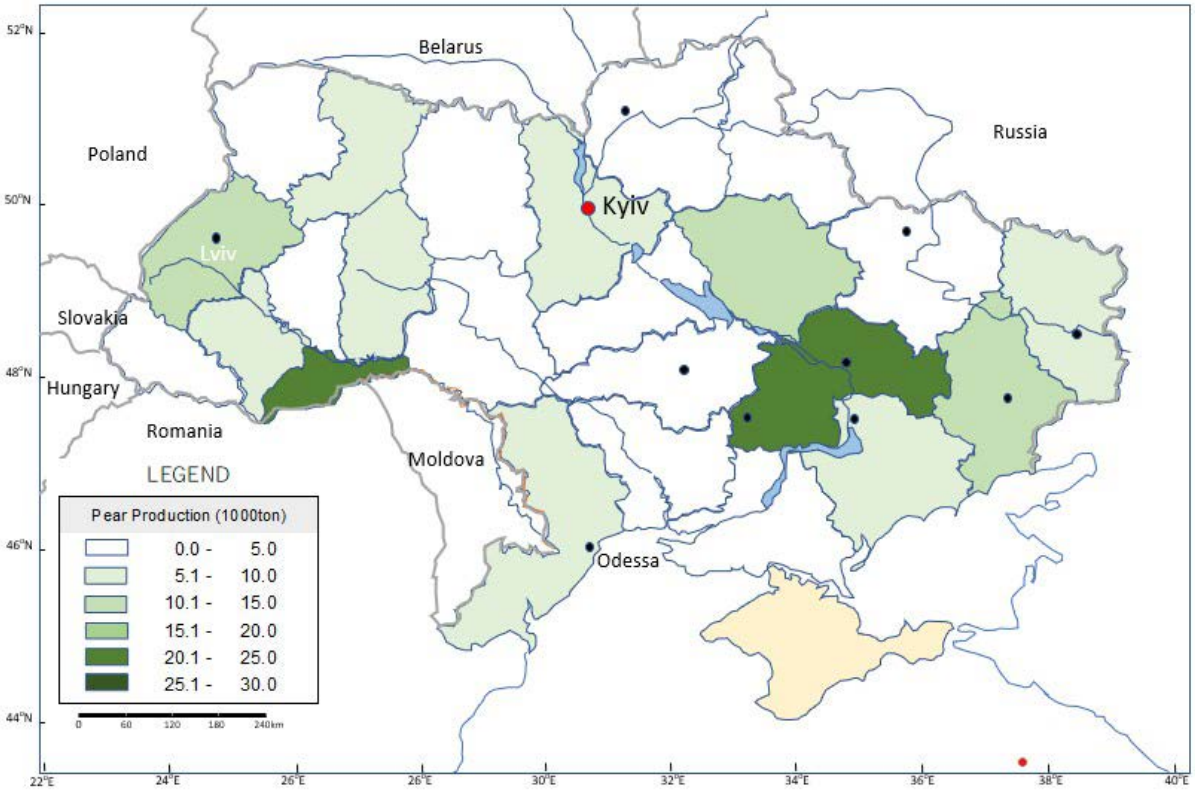


Figure 19.1 Pear Production by Oblast in 2021

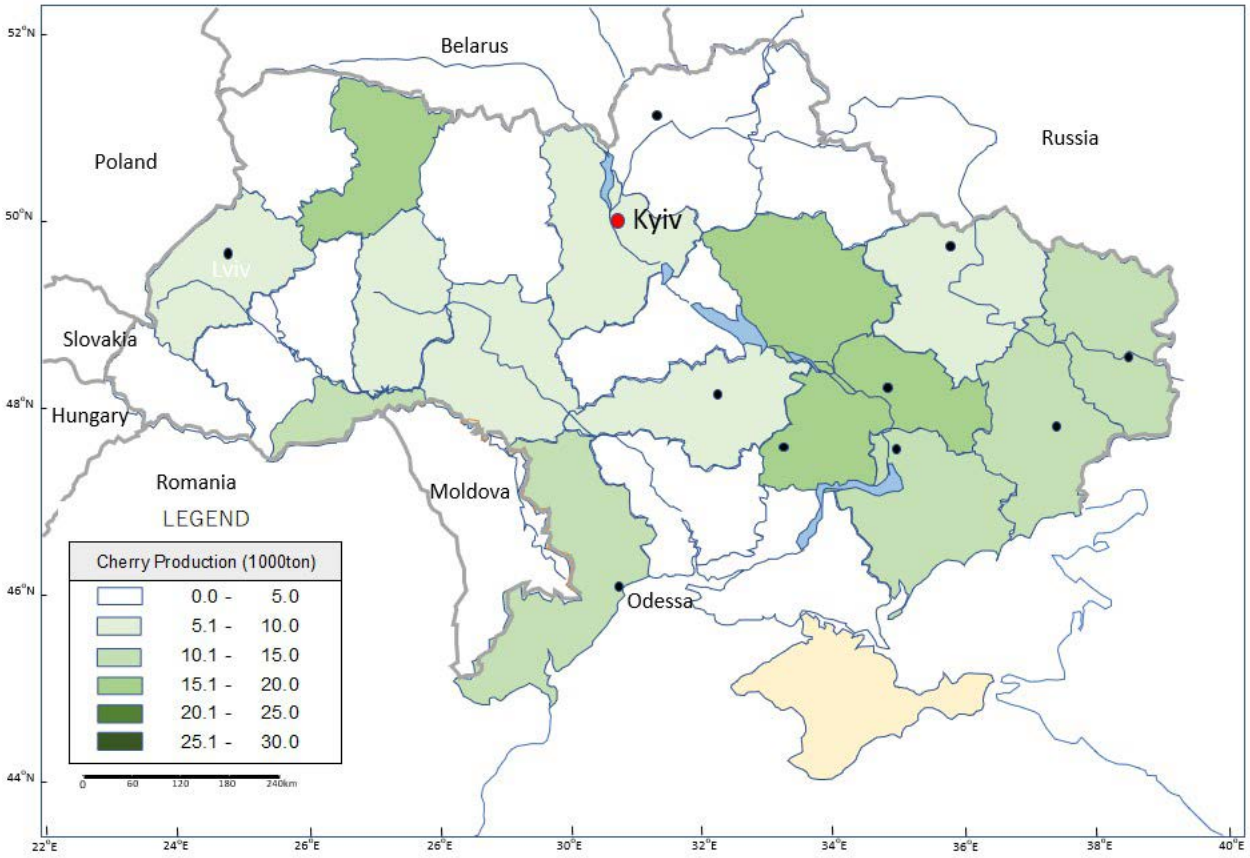


Figure 20.1 Sour Cherry Production by Oblast in 2021

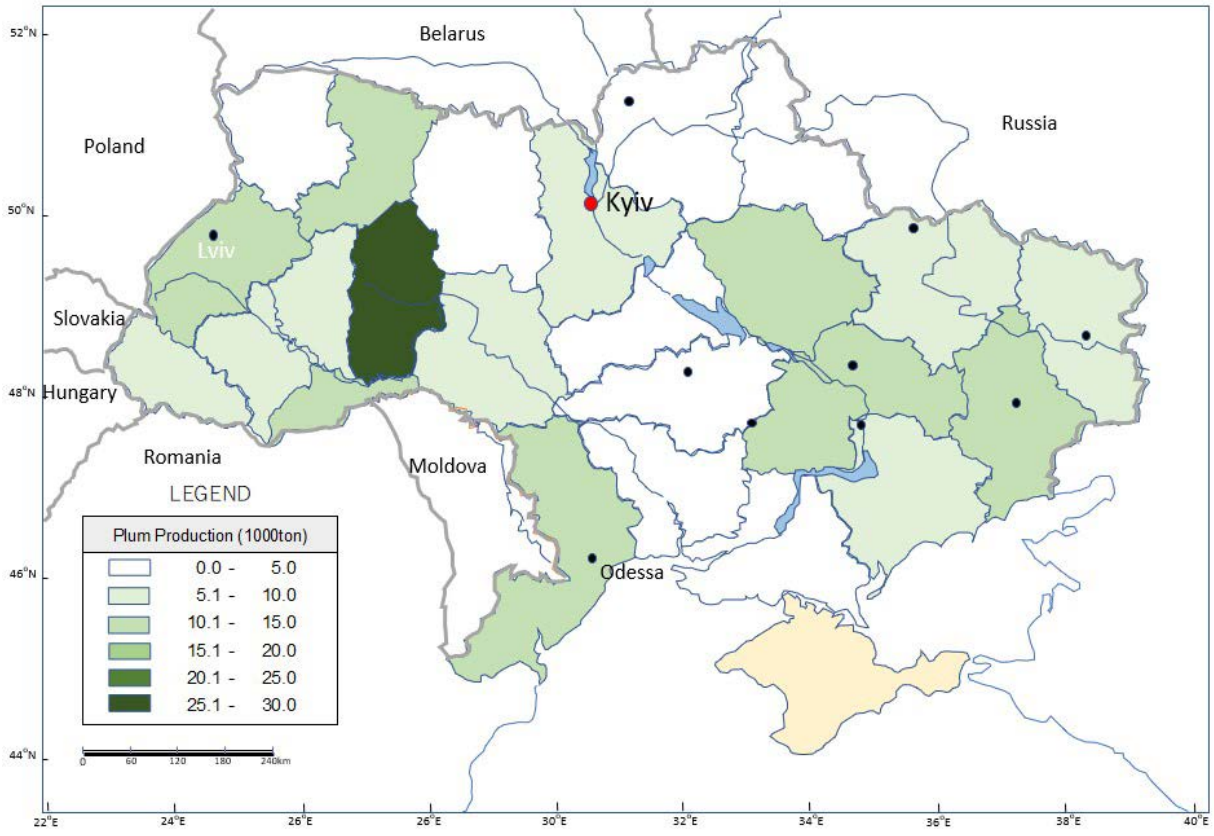


Figure 21.1 Plum Production by Oblast in 2021

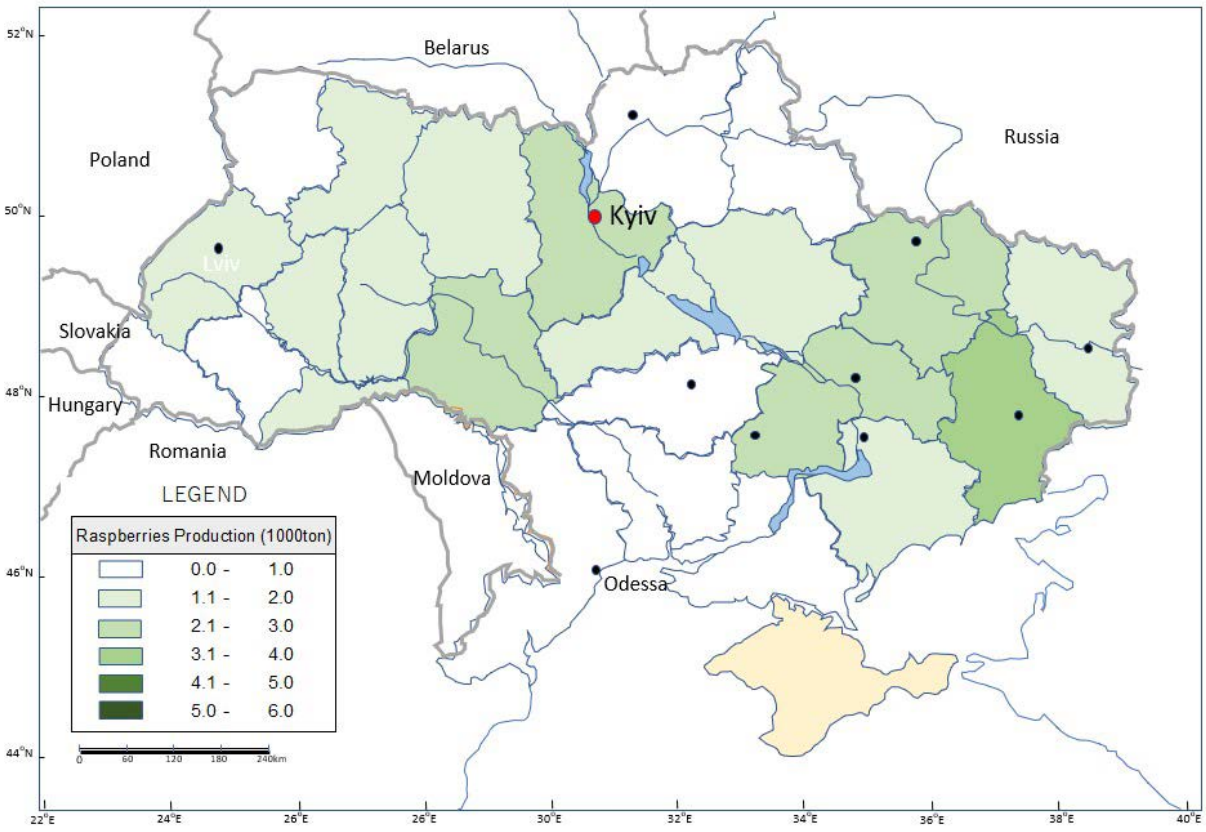


Figure 22.1 Rasberries Production by Oblast in 2021

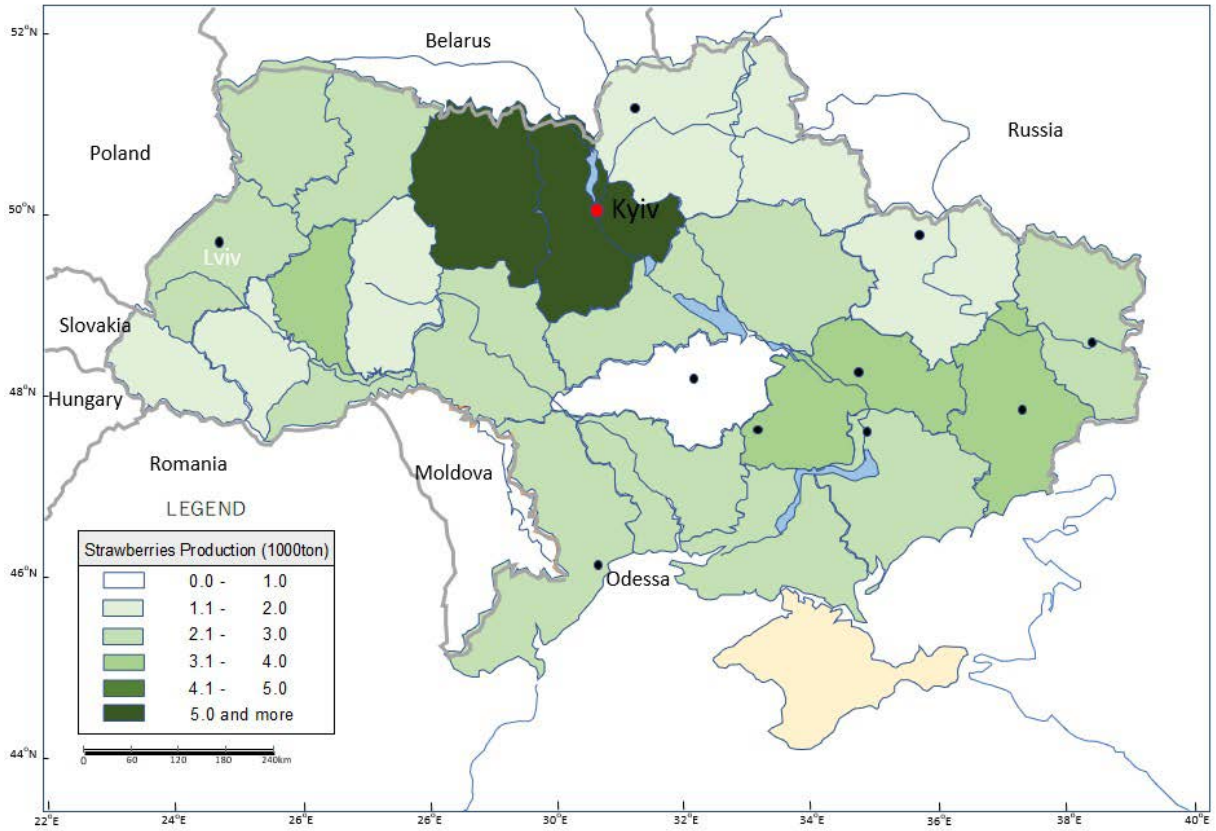


Figure 23.1 Strawberries Production by Oblast in 2021

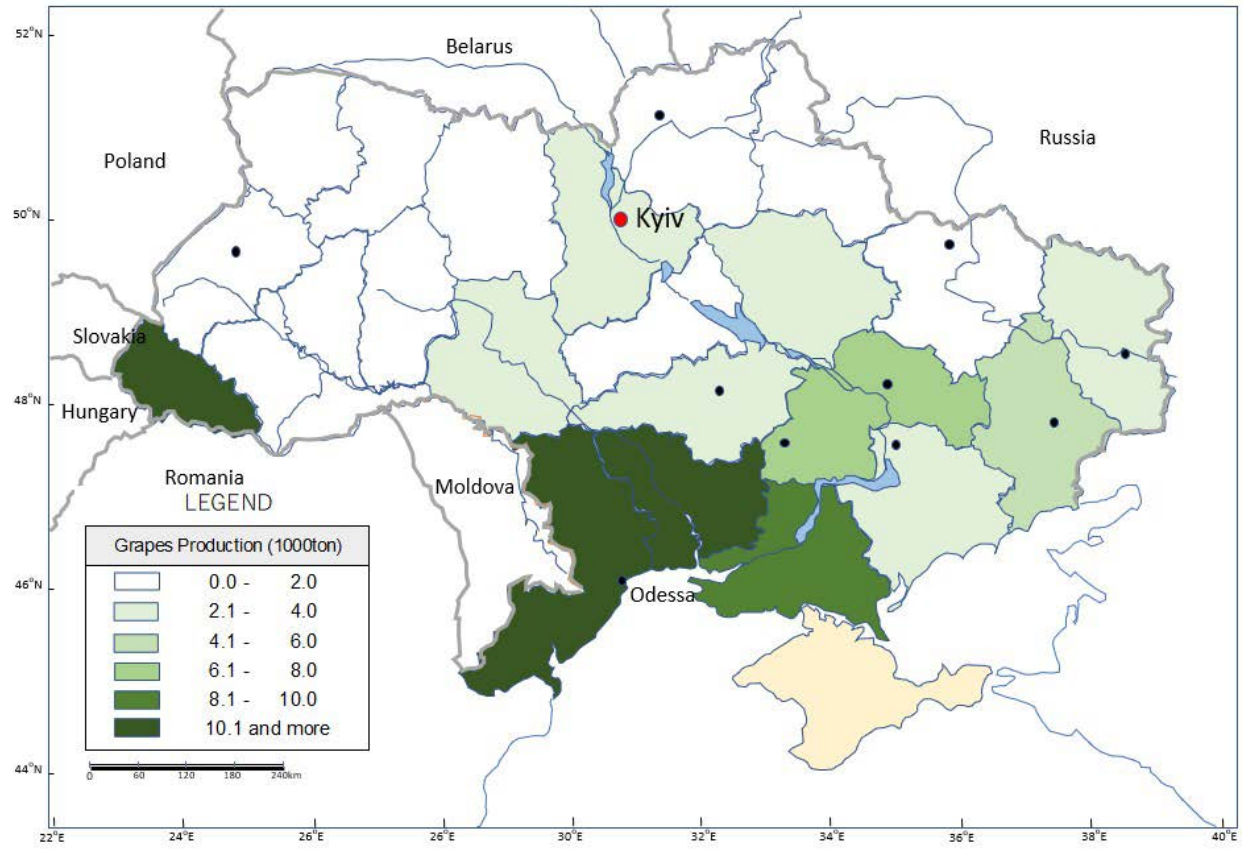


Figure 24.1 Grapes Production by Oblast in 2021

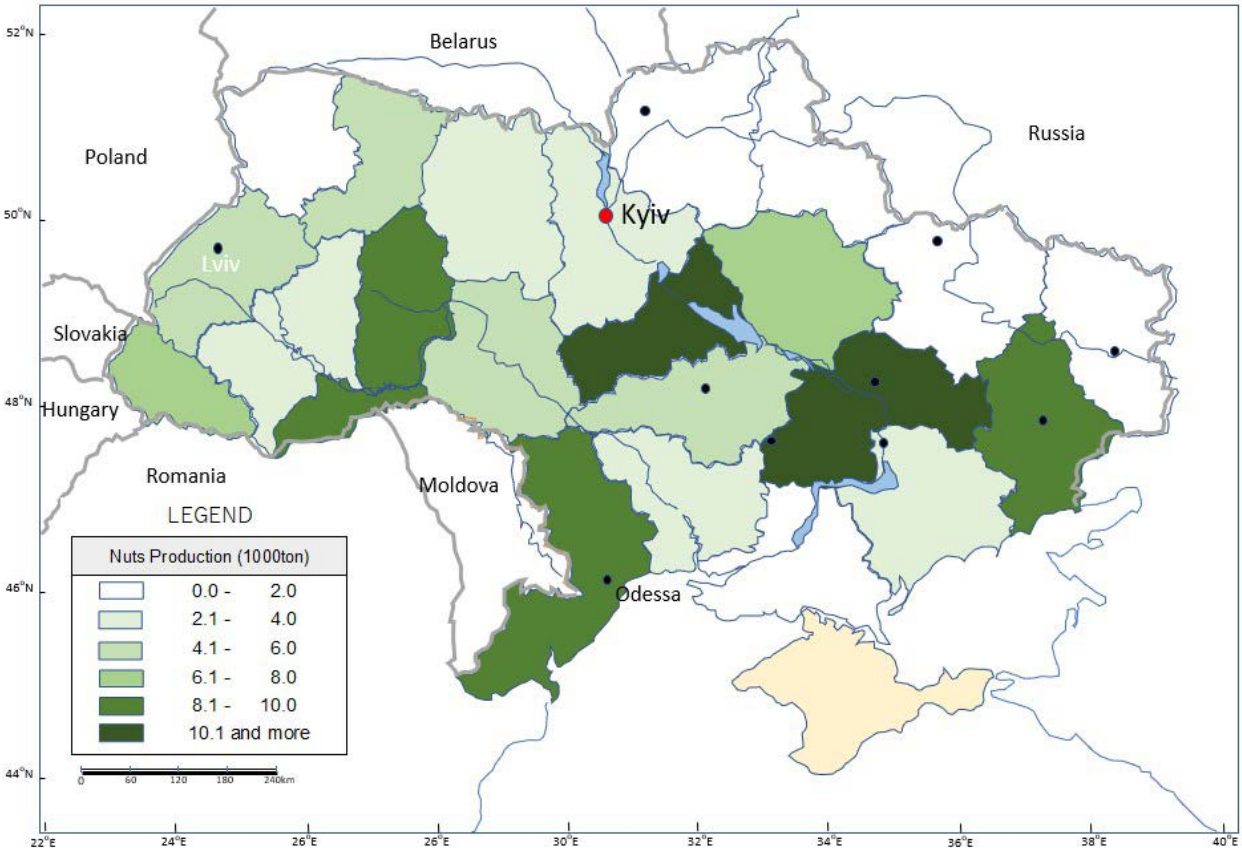


Figure 25.1 Nuts Production by Oblast in 2021

Annex 2.5.1

Fincancial Access

Annex 2.5.1 Financial Access

Table B2.5.1 Financing schemes for the agricultural sector offered by major banks

Bank name		Private Bank	Ukr Exim Bank	Ukrgas Bank	Raiffeisen Bank	First Ukrainian International Bank	Ukri Sib Bank	OTP Bank	Credit Agricole
Loan type	conditions								
credit line	interest rate	0% up to 1 month after martial law ends, then 5%*	not listed			from 25%	9.99%	USD/Euro is LIBOR/Eurobor + margin or market interest rate, UAH is fixed or market interest rate	UAH 15%, USD 6.5%, EUR 5.5%
	Amount of loan	1-5 million UAH	not listed			Up to 50 million UAH	Up to 25 million UAH	12-40 million UAH	Up to 60% of sowing and harvesting plans
	Loan period	Until March 1, 2024	up to 12 months			up to 60 months	up to 12 months	Maximum up to 3 years, usually up to 1 year	up to 18 months
	collateral	not listed	current assets			Deposits, real estate, agricultural machinery, and other current assets	Liquid property, real estate, equipment, vehicles Pledge of the future harvest or agricultural receipt Pledge of property rights under forward contracts Double warehouse certificates (on pldge of grain)	not listed	Borrower's real estate, equipment, vehicles and other assets or guarantor's assets
Purchase of agricultural machinery	interest rate	UIRD** (3 months) +7%, to 0	not listed	not listed	19.5-21%	15%~	9.99%～		UAH 15%, USD 6.5%, EUR 5.5%
	Amount of loan	100,000 UHA～	not listed	25,000 to 80 million UAH, 80% of market price for new products, 70% for used products	Up to 37.3 million UAH	Up to 50 million UAH	Up to 7 million UAH (up to 1 million UAH for cars)		not listed
	Loan period	1-3 years	Up to 7 years for new purchases (excluding imports from CIS) Up to 5 years for others	Up to 7 years for new imports from the US, Canada, Japan, and South Korea; up to 5 years for others; up to 3 years for second-hand products	6-60 months	up to 60 months	Up to 60 months depending on the type of equipment, up to 36 months for domestic equipment and new automobiles		up to 60 months
	collateral	not listed	current assets	Purchased machinery and equipment	Purchased machinery, other current assets, deposits	purchased machine	Purchased machinery and equipment		Technique/ equipment which is purchased for credit funds and/or property owned by the client proporty guarantor (real estate, equipment, vehicle, other assets)
capital investment	interest rate		not listed					UAH 23%~, Euro 7%~, USD 8%~	UAH 15%, USD 6.5%, EUR 5.5%
	Amount of loan		not listed					3-20 million UAH	Up to 75% real estate for single collateral, up to 90% if other assets are added
	Loan period		Up to 60 months for purhcase of real estate and company acquisitions, up to 36 months for others					not listed	Up to 60 months for fixed asset purchase/construction, up to 36 months for reconstruction/repair
	collateral		current assets					Up to 3 million UAH: not required, 3 - 20 million UAH: Agrarian receipt/Future crops 150% (from limit amount), equipment/real estate 40% (from limit amount) over 20 million UAH: Agrarian receipt/Future crops 150% (from limit amount), equipment/real estate 60& (from limit amount)	Property which is purchased for credit funds and/or property owned by the client/ property guarantor (real estate, equipment, vehicles, other assets)
Notices		*When preferential loan 5-7-9% is applied		There is also a separate loan for eco-machines with restrictions on fuel consumption, emissions of hazardous substances, etc.		Loan eligibility requirements: Ownership or lease of land of 500ha or more, 3 years of operational experience	West, North and Central are priority areas		In addition to the above, loans for automobile dealers and deposit-backed loans are available. For loans for agricultural machinery, there are conditions such as 24-month operation record, product designation, financial status, and account opening obligation.

*Ukrainian Index of Retail Deposit Rate

Source: Prepared by the study team based on each bank's website

Table B2.5.2 Loan by deposit taking institution to non-financial enterprises by size (Unit：UAH Billion)

Period	Total	including by type currencies		By dimension of enterprise																		
				large enterprises			medium-sized enterprises			small enterprises (except for microenterprises)			microenterprises									dimensi-on is not defined
													annual income from 500 thousand Euros to 2 million Euros			annual income from 50 thousand Euro to 500 thousand Euros			annual income up to 50 thousand Euros			
				total	including		total	including		total	including		total	including		total	including		total	including		
		national currency	foreign currency		national currency	foreign currency		national currency	foreign currency		national currency	foreign currency		national currency	foreign currency		national currency	foreign currency		national currency	foreign currency	
2017	829,932	455,095	374,837	310,948	144,254	166,694	209,521	108,914	100,606	111,054	52,745	58,309	29,186	19,316	9,869	16,737	10,236	6,502	67,016	61,558	5,458	85,470
2018	859,740	464,023	395,717	310,066	139,518	170,548	212,490	115,845	96,645	94,485	49,302	45,183	29,428	20,254	9,175	27,428	10,984	16,444	72,468	61,933	10,535	113,375
2019	744,648	426,514	318,134	234,658	115,639	119,019	184,783	93,439	91,344	73,807	39,753	34,054	44,625	36,183	8,442	44,420	28,816	15,604	76,455	67,977	8,478	85,900
2020	724,157	409,517	314,640	220,837	91,555	129,283	213,960	117,905	96,054	70,135	38,806	31,330	46,026	34,679	11,347	42,342	27,453	14,889	72,350	65,368	6,983	58,506
2021	752,324	484,060	268,264	204,204	104,399	99,805	213,231	135,335	77,896	86,517	54,670	31,847	52,254	44,223	8,031	33,998	31,222	2,776	72,560	68,065	4,495	89,561
2022	777,369	514,144	263,225	216,797	110,754	106,043	211,959	147,354	64,605	84,295	60,145	24,150	57,722	50,096	7,626	34,841	31,753	3,088	67,506	64,514	2,992	104,249

*Data for 2022 is as of the end of November

Source: Prepared by JICA Survey Team based on NBU statistics

Table B2.5.3 Names of agricultural enterprises benefiting loans of international finance institutions

Company Name	Parent company, head office, joint venture	Economic activity	International organization name			Multiple borrowing from the same lender		
			IFCMore	EBRD	EIBs	IFCMore	EBRD	EIBs
JV LLC Nyva Pereyaslavshchyny		Pig farming enterprises (11 pig farms), grain production (23,000 ha of cultivated land), pig farming, slaughter, meat processing	●	●				
FE Integrated Agrosystems		Tomato paste manufacturing, tomato production enterprise (3 factories, 750,000 tons of seasonal production, 2 sowing greenhouses, 25,000 ha of irrigated farmland lease),	●	●				
Astrata-Kyiv, TOV		Grains, oilseeds, sugar, milk production, soybean crushing (for feed, oil)	●	●	●		●	
Nibulon Agricultural LLC		Cereals, oilseed production and export	●	●	●		●	
Myronivsky Khiboprodukt, Publichne AT		Poultry farming (integrated production)	●				●	
MRIYA Agrokholdyng, TOV	Headquartered in Cyprus, listed on the Frankfurt Stock Exchange	Wheat, barley, sugar beet, rapeseed, potato and other grain production, grain storage	●			●		
Sandra TOV		Juice and nectar production	●					
Kernel Holding SA		(1) Two grain silos, (2) Construction of grain handling and storage facilities at Chernomorsk		●	●		●	
Agrokompleks Zelen Dolyna LLC		Grain cultivation (25,300 ha), cattle, sugar production		●				
Ukroliya LLC		Sunflower oil production		●				
Enzym PJSC		Yeast production		●				
Kormotech LLC	Parent company Cyprus Vengast Investment Ltd	Pet food producers		●				
Novus Retail and Logistics		Food retail (supermarket)		●				
Baryshevska Grain Company LLC		Grain production (55,000 ha)		●				
Silpo-Food LLC		Food retail (over 500 store network)		●				
Lantmannen Ukraine	Parent company Sweden Lantmannnen ek	Breakfast cereal production,		●				
Dniproenergo-Resours LLC		Biomass production (Dniprovska Agri Group)		●				
Industrial Milk Company		Cereals, oilseed production, storage, processing, potato production, dairy farming	●	●				
Louis Dreyfus Company	Parent company Louis Drefus in Switzerland	Production, processing, marketing and transportation of agricultural products		●			●	
Ukrainian Agrarian Investment		Grain production (195,000 ha)		●				
GN Terminal Enterprises Ltd		Integrated production and export of grains, Odessa port grain terminal operation		●				
Vioil		Sunflower oil production and export		●				
Agri Europe		Sugar, meat processing and sales		●				
NCH New Europa Propoerty Funding LP		Farm management, technical guidance		●				
Danosha	Parent company Denmark Axzon Group	Integrated pig production	●	●				
NCH Agrobusiness Partners LP		Farm management, technical guidance		●				
Inter Group		Integrated production of eggs and compound feed		●				
Alfred C. Toepfer	Parent company Ran Alfred C. Toepfer International	Agricultural product sales, grain and oilseed production		●			●	
ED&F Man		Agricultural product sales, sugar beet production		●				
Agrotrade WC		Grain value chain management, agricultural producers		●				
Viterra Inc.	Headquarters Canada	Production and export of major agricultural products		●				
Globino		Feed factory, pig farming, meat processing integrated production	●	●				
Ukrainian Farm Funding Limited		Parent company of 70 grain farmers		●				
Obolon CJSC		Beer and soft drink manufacturing		●			●	
Maisadour Semences Ukraine	Joint venture between Maisadour Semences SA of France and Syngenta of Switzerland	Seeds, grains, vegetables, livestock feed, poultry, retail		●				
Noble Resources Ukraine LLC	Parent company Banmuda Noble Group	Production, storage, processing and marketing of agricultural products		●				
Desnagrain	Parent company France Champagne Cereales	Purchasing malting barley, grains and oilseeds		●				
OKSC Shostka City Milk Factory	Acquisition of Shostka by French Bel Group and EBRD	Cheese production		●				
Agroinvest		Grain production, sales, silo operation (Agriholding, MK Group)		●				
Chumak		Tomato processed products, food oil, mayonnaise, pickled vegetables, canned vegetables production		●			●	
Ilchevsk Maslo Extraction Zavod J	A joint venture between Archer Daniels Midland (U.S.) and Risoil SA (Switzerland)	Edible oil production		●				
Bayer Farmer RSF	Parent company Bayer A	Supply of pesticides, herbicides and fungicides;	●			●		
New World Grain	Parent company Buddha	Wheat and barley production	●					
Delta Wilmar CIS Limited		Manufacture of coconut oil and shortening	●			●		
Kontsern Khibprom, Publichne AT		Bread and confectionery manufacturing	●					
Sandra TOV		Juice and nectar production	●			●		
Closed Joint Stock Company Rise		Agricultural input production, agricultural machir	●					
Savservice MOVA TOV		Warehousing and transportation of consumables	●					
Epicentr K TOV		no mention			●			

Source：Prepared by JICA Survey Team from IFC, EBRD and EIB homepage

Table B2.5.4 Issues of access to finance, existing support measures, remaining issues, and possible areas of assistance

Perspective of approach	Challenges of access to finance	Existing support measures	Remaining issues	Possible areas of assistance
Finance	● Scarcity of the absolute volume of loans to the agricultural sector	● Expansion of loans to agricultural SMEs through BDF with foreign assistance (EBRD, IFC, EIB, KfW)	● Securing lending resources under the expanding fiscal deficit	● Construction and operation of credit history database ● Provision of two-step loans for agricultural SMEs
	● Insufficient provision of credit by non-bank financial institutions, unequal footing in competitive conditions between non-banks and banks, low capacity of non-bank financial institutions	● Development of non-banks by NBU (supported by IMF and World Bank) ● Strengthening the management capacity of credit unions (USAID CAP)	● Tighter regulations on non-banks, strengthening foundations of non-bank management ● Strengthening the management capacity of credit unions not supported by USAID CAP	● Strengthening the management capacity of credit unions not supported by USAID CAP ● Creation of movable registry for expanding leasing business
	● Scarcity in liquidity due to banks' high non-performing loan ratio	● Financial sector reform by finance minister, reform of state-owned bank (IMF, WB)	● Further improvement of the non-performing loan ratio of state-owned banks, dealing with new non-performing loans caused by the war	
	● Credit union loans extension limited to individuals	● Relevant amendment of law under parliamentary discussion (USAID CAP)		
	● Credit unions are not eligible for deposit guarantees	● Lobbying for adopting deposit insurance to credit unions to the government (USAID CAP)		
	● Limitation of credit unions' lending capacity, need to strengthen credit screening capacity	● Supplying loan resources to credit unions and strengthening credit screening capabilities (USAID CAP)	● Secure lending resources for credit unions, strengthen credit screening capacity of credit unions not supported by US SAID CAP	● Strengthening the credit screening capacity of credit unions not supported by USAID CAP ● Provision of a two-step loan to the credit unions not receiving assistance from USAID CAP, combined with support for member borrowers on management of farm operation and borrowing
	● High lending interest rate	● Introduction of partial credit guarantees (WB, EC)	● Implementation of partial risk guarantee	
	● Agricultural insurance is not sufficiently utilized	● Introduction of Agriculture Insurance (IFC)	● Insufficient subvention for insurance premium due to budget shortfalls, abolition of insurance pools	
	● Movable property registration is limited to automobiles and tractors, and there is no registration system for stationary machinery.		● Creation of movable and immovable property registry including stationary machinery	● Support for development of movable and immovable registry
Small and medium-sized enterprises	● Shortage of loans for agricultural SMEs	● Expanding lending to agricultural SMEs through BDF (EBRD, IFC, EIB)	● Insufficient progress on policy items related to improving access to finance in the 2017-2020 SME Development Strategy	● Two-step loan for small and medium-sized agricultural enterprises ● Support on policy implementation and coordination between Minister of Economy, Entrepreneur Export Promotion Bureau and local governments' support unit for coordinated support on export promotion, including quality control, etc. by agricultural small and medium enterprises
	● Insufficient loan application capacity of agricultural SMEs	● Provision of training on management through EU4Business (EC)	● Expansion of the number of companies to be supported	
Agriculture (farmer)	● Household farms are outside the agricultural policy of the Ministry of Agriculture and Food		● Household farmers are outside of the agricultural policy sphere by the Ministry of Agrarian Policy and Food	● Establishment of policy measures to support household farms
	● Lack of property that can be used as collateral	● Introduction of Warehouse Receipt, Crop Receipt, Value Chain Financing (IFC, EBRD, USAID CAP)	● Underutilization of warehouse receipts, crop receipts and value chain financing	● Introduction of warehouse receipts for small and medium-sized grain producers in conjunction with the construction of grain warehouses, and creation a system for their utilization ● Support for credit union on utilization of crop receipt ● Supporting the introduction of value chain financing led by credit unions, on the assumption that credit unions are allowed to lend to legal entity
	● Use of land as collateral	● Revision of the Land Law ● Improvement in land transactions and the functions of the land market, ensuring transparency, protection of land ownership (WB)	● Lifting of the ban on land transactions by corporations up to 10,000ha in January 2024 ● Achieving WB Project’s unachieved Disbursement Linked Indicators (14 out of 20 indicators)	

Source: JICA Survey Team

Annex 2.5.2

Activities of the other donors / institutions

Annex 2.5.2 Activities of the other donors / institutions

Numerous multilateral institutions and the other donors are providing support to Ukraine. The followings are the major ones.

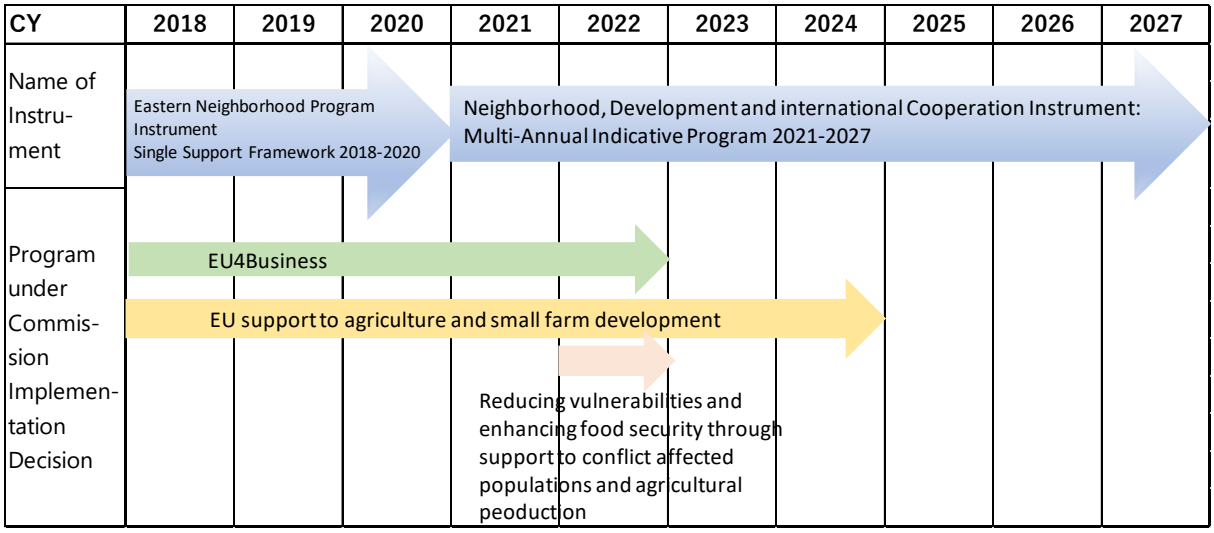
(1) European Union (EU)

a) Mechanism of implementation

The EU's assistance to Ukraine is based on the Association Agreement, which was signed in June 2014 and entered into force in 2017, and the Deep and Comprehensive Free Trade Area under the Agreement. Assistance to Ukraine is handled by the Directorate General for European Neighborhood Policy and Enlargement Negotiations of EC, which is the administrative executive body of the EU.

In 2014, after the occupation of the Crimea peninsula by the Soviet troops, the Support Group for Ukraine (SGUA) was formed within EC by representatives of member countries and EU institutions to support various reform programs in Ukraine. It functions as the core of assistance to Ukraine by coordinating assistance and providing advice.

EC has established a multi-year support policy framework, based on which specific implementation plans are drawn up and implemented on an annual basis. Figure B2.5.1 illustrates the relationship between the planning period for Instruments and the program for each year as determined by the Committee.



Source: Prepared by the survey team based on EC's website

Figure B2.5.1 Instruments and Programs based on Commission decision

The current framework of assistance to Ukraine is the 2021-2027 Multi-year Indicative Program of the Neighborhood Development and International Cooperation Instrument, which was announced at the EU Ukraine Summit[i] held in October 2021. The 2021-2027 Multi-Year Indicative Program has identified five priority areas (Table B2.5.5), providing a comprehensive framework for the EU 's assistance to Ukraine, not just in the economic sector.

Table B2.5.5 2021-2027 Multi-Year Program Priority Areas

Priority area 1 A resilient, sustainable, and integrated economy
Priority area 2 Accountable institutions, rule of law and security
Priority area 3 Environment and climate resilience
Priority area 4 A resilient digital transformation
Priority area 5 A resilient, gender equal, fair and inclusive society

Source: Prepared by the survey team based on Neighborhood Development and International Cooperation Instrument: 2021-2027 multi -year indicative program

Based on this program, an Economic and Investment Plan was formulated. Economic Investment Plan stipulates the following major initiatives: (Table B2.5.6)

Table B2.5.6 Main Initiatives of Economic Investment Plan

initiative	content
1. Support for a sustainable, innovative, green, and competitive economy: Direct support for 100,000 SMEs	Supporting business incubators and improving access to finance for SMEs. The goal is to support 100,000 SMEs and self-employed people
2. Economic transition for rural areas, assistance to over 10,000 smallholder farmers	Supporting the introduction of partial debt guarantees for more than 10,000 smallholder farmers to facilitate the provision of affordable loans and the purchase of farmland.
3. Improved connectivity by upgrading border crossing points	Improving physical infrastructure, introducing intelligent systems for heavy trucks and IT systems
4. Promoting digital transformation: Modernizing public IT infrastructure	Modernization of digital infrastructure of Ukrainian government, strengthens cybersecurity
5. Increased support for energy efficiency improvements for renewable hydrogen	Improving the energy efficiency of multi-apartment buildings, saving household energy bills, financing projects to reduce energy loss, and supporting renewable hydrogen development

Source: Prepared by the survey team based on Neighborhood Development and International Cooperation Instrument: 2021-2027 Multi-year Indicative Program

Of the major initiatives, the policy items related to this study are "1. Support for sustainable, innovative, environmentally friendly, and competitive economies" and "2. Economic transition for rural areas, assistance to over 10,000 smallholder farmers". These support are the continuation of the support for SMEs and smallholder farmers that has been implemented under the 2018-2020 Eastern Neighborhoods Program Instrument Single Support Framework (hereinafter "Single Support Framework").

The year 2021, the first year of the multi-year program of the Neighborhood Development and International Cooperation Instrument, did not provide assistance directly related to farmers' access to finance. On the other hand, in the implementation plan for 2022[ii], in the wake of Russia's invasion to Ukraine, the content of assistance is repositioned as support for strengthening national resilience to reinforce humanitarian assistance, and a budget support named "Reducing Vulnerability and Enhancing Food Security through Support to conflict affected population and agricultural production in Ukraine" was implemented. The implementation plan of this support was revised three times in 2022[iii], including the revision on July 1, which aims to ensure domestic food security and economic recovery through continued food production and provision of working capital to smallholder farmers. For that purpose, through the State Agrarian Register (SAR) implemented by the Ukrainian government, a Production

Support Grant will be provided to small-scale farmers (100 Euro per 1ha for the cultivated area less than 120 ha, and 170 Euro per cow). It is estimated that about 10,000 small-scale farmers will be supported[iv]. EC intends to encourage farmers to register with the SAR, especially unregistered small-scale farmers through the provision of grant aid for production support under this implementation plan. The aid amount was originally €500 million in July 2022 , but was increased to € 566 million with the revision on 29 January 2022 , together with the budget of other assistance items shown in Table 2.6.24.

Table B2.5.7 Objectives of "Reducing Vulnerability and Enhancing Food Security through Support to conflict affected population and agricultural production in Ukraine"

1. Supporting the livelihoods needs of conflict affected population through capacity building of Ukrainian public institutions 2. Housing supply for internally displaced people and returnees 3. Providing working capital to registered farmers and individual farmers to continue agricultural and food production, improve the financial situation of agricultural producers, and encourage the use of SAR

Source: Prepared by the survey team based on EC materials

May 2022, EC proposed the establishment of the "Ukraine Reconstruction Platform" for the reconstruction and reconstruction of Ukraine[v] in conjunction with the establishment of the National Council for Recovery by the Ukrainian government. A multi-donor collaborative platform was established in January 2023. A proposal has been made for EU and Ukraine to co-chair the "Ukraine Reconstruction Platform", and it is believed that EU will play an active role in the reconstruction phase as well.

b) Assistance related to access to finance

2018-2020 Single Support Framework of EC formulated before the invasion of Russia lists "Economic development and market opportunity (including private sector development and improvement of the business environment)" in the second objective among the following seven objectives. (Table B2.5.8) In three years, 20% of the total budget was planned to be allocated to this sector[vi], between 86.76 million and 106.04 million Euros.

Table B2.5.8 Objectives of 2018-2020 Single Support Framework " Economic Development and Market Opportunity "

1. Gradual transition of the legal system and regulatory framework to EU standards, enhancement of the implementation capacity of the Ukrainian government, reduction of technical and administrative obstacles related to business and trade, promotion of exports and innovation 2. Growth of SMEs through improvement of legal and financial conditions, improvement of access to finance, including for Ukrainians living abroad, and promotion of investment 3. Transparent privatization and reorganization of state-owned enterprises, improvement of efficiency of remaining state-owned enterprises, effective policies for private sector development, formulation of legal framework, protection of individual entrepreneurs, development of sectors with high growth potential 4. Strengthening the base of local and regional economic development and strengthening regional competitiveness 5. Upgrading technology, including entrepreneurship, reducing the informal economy, narrowing the gender gap, reducing gender discrimination in the labor market, regularizing employment, improving the working environment through wage increases 6. Strengthening the digital economy, strengthening the harmonization with the unified digital market of European Union 7. Improving intergovernmental coordination on innovation policies, including means of implementation, planning and innovation support schemes

Source: Prepared by the survey team based on the 2018-2020 Single Support Framework

Table B2.5.9 summarizes the expected results of objectives 2. and 4. related to access to finance in the agricultural sector among the seven objectives above.

Table B2.5.9 2018-2020 Results of Single Support Framework "Economic Development and Market Economy"

Objective	Expected results
2.	Strengthening capacities to establish sound legal and financing conditions for starting and operating SMEs; improving conditions of access to finance, including for women entrepreneurs, internally displaced person, and conflict-affected areas; capacity building for attracting investments, including those from Ukrainians living abroad
4.	Strengthening fiscal allocation to regional and local development strategies for agricultural and other economic development

Source: Prepared by the survey team based on the 2018-2020 Single Support Framework

Based on the Commission's Implementation Decision to achieve these two goals of the Single Support Framework for 2018-2020, the following two items which are relevant to this study were budgeted for 2020.

1. EU4Business (SME support) 20 million Euros
2. Support for smallholder farmers 25 million Euros

The outlines are shown below.

1.Support for Small and Medium Enterprises (SME) (EU4Business)

Since 2009, EC has been implementing assistance called the Eastern Partnership to the countries of Eastern Europe and the South Caucasus region. In addition to Ukraine, the countries covered by the Eastern Partnership Program are Armenia, Azerbaijan, Belarus, Georgia and Moldova. It is a regional program that provides support to address global policy challenges such as climate change and the Sustainable Development Goals.

EU4Business is one of the supports that make up the Eastern Partnership Program. Since EU places SMEs at the core of its regional economic activities, and SMEs make up the majority of private sector

companies even in countries in transition to a market economy, this measure was formulated to support them. The program is common to all target countries and consists of the following three sub-programs. (Table B2.5.10)

Table B2.5.10 EU4Business program

subprogram	content
Access to finance	Loans at preferential interest rates through domestic banks, microfinance for family-run businesses, small-scale grants for small and medium-sized enterprises, training for domestic bankers for financing to small- and medium-sized enterprise, and strengthening of the financial capacity of small and medium-sized enterprises
Market access	Providing direct training and advice to SMEs, assisting in strengthening the capacity of domestic business support organizations, establishing business incubators, developing business clusters for mutual assistance, assisting governments in developing new markets, strengthening the capacity of export promotion agency
Access to knowledge	Implementation of regulatory reform and presentation of best practices, capacity building of policy makers and regulators, promotion of public-private dialogue, and provision of information on reform programs to entrepreneurs

Source: Prepared by the survey team based on EC materials

2. Support for agriculture and small-scale farmers[vii]

This is a program designed for promoting an inclusive, competitive and growth-oriented agricultural sector based on the recognition that rural smallholder farmers belong to informal economy and therefore have difficulty in access to finance. Table B2.5.11 provides an overview of the entire program.

Table B2.5.11 Contents of support for agriculture and smallholder farmers

Component	Expected results
1. Institutional and sectoral reforms in agriculture and rural areas	1. Organizational reform of the Ministry of Economic Development, Trade and Agriculture (currently the Ministry of Agrarian Policy and Food) to enable the implementation of policies on agricultural policy, the Association Agreement with the EU and a comprehensive free trade area. 2. Strengthening the policy implementation capacity of implementing agencies in the fisheries and forestry sectors
2. Strengthening agricultural value chains and supporting smallholder farmers	1. Incorporating smallholder farmers into agricultural value chains and establishment and strengthening of producer organizations 2. Development of financial products that meet investment needs of smallholder farmers such as land acquisition 3. Improving access to finance for smallholder farmers to enable investment, capacity expansion and land acquisition

Source: Prepared by the survey team based on EC materials

Table B2.5.12 shows specific support measures for Component 2. “Strengthening agricultural value chains and supporting smallholder farmers in this program”.

Table B2.5.12 Measures to Strengthen Agricultural Value Chains and Support Smallholder farmers

Expected results	Specific measures
1. Incorporating smallholder farmers into agricultural value chains and establishment and strengthening of producer organizations	1. Market analysis aimed at identifying priority value chains. 2. Support for formulating value chain policies. 3. Introduction and trial of agricultural extension system 4. Establishment and strengthening of producer organizations. 5. Quality improvement and marketing support for local products. 6. Building relationships between brokers and smallholder farmers, supporting trade development between different regions.
2. Development of financial products that meet investment needs of smallholder farmers such as land acquisition	1.Providing information to smallholder farmers and banks on profitable small business models and value chains for livestock and horticultural crops. 2. Providing training on financial literacy, advisory services, guidance, accounting service assistance for smallholder farmers, and supporting the formulation of business plans for livestock and horticultural crops to enable financing. 3. Providing training for bankers to establish a new department to screen loan applications from smallholder farmers and supporting the establishment of evaluation criteria and process of a lending and leasing mechanism which accommodate customer needs. 4. Help the private sector to improve access to land, yields, remote sensing and other registry data.
3. Improving access to finance for smallholder farmers to enable investment, capacity expansion and land acquisition;	1. Grasping the investment needs of local smallholder farmers and micro- and SMEs. 2. Support for formulating selection criteria for matching grants. 3. Providing information, training, advice and support to smallholder farmers. 4. Efficient operation of matching grant schemes for smallholder farmers. 5. Establishment and operation of an innovative matching grant pilot scheme to facilitate access to financing and leasing for smallholder farmers. 6. Full scale operation of the pilot scheme.

Source: Prepared by the survey team based on EC materials

This program is supposed to be implemented over 84 months from 2018, but at the time of the survey, following Russia's invasion of Ukraine in February 2022, the implementation plan for 2022 has been changed as described above.

During an interview with an officer in charge of the Kyiv office of EC[viii], it was explained that the distribution of the production support grant through SAR had been carried out. This activity is under “3. Providing working capital to registered farmers and individual farmers to continue agricultural and food production, improve the financial situation of agricultural producers, and encourage the use of SAR” of “Reducing Vulnerability and Enhancing Food Security through Support to conflict affected population and agricultural production in Ukraine” described in Table B2.5.6. In addition, it was also explained that the provision of grant for investment and of partial credit guarantees were being considered as the next step of support.

The provision of grant for investment is a program of matching grant of EUR 10,000, in which 20% of the investment amount is prepared by the farmers and the rest is provided by EC. Targets are farmers with 100 ha or less of cultivated land and not yet registered. In addition, investment support with an upper limit of 25,000 Euros for the food processing industry will be provided in parallel. Dairy products, wines, soft fruits, berries, food and vegetables are targeted in Carpathian region and in four oblasts in

the Western Region and the support aims to build an agricultural value chain. It is expected that bidding for the implementation of the pilot scheme will be held in February 2023, the implementer will be selected by the end of April, and the first funding will be provided by the summer. The budget for 2023 is 6 million Euros, and the intention is to expand the scale from next year onwards. It is also planned to expand the target area in the future.

The partial credit guarantee guarantees 50% of the expected loss of loans from partner banks and is intended for registered smallholder farmers up to 500 ha. It is for capital investment and land purchase. It has secured a budget of 20 million Euros for the second half of this year and plans to make the first investment in a partial credit guarantee fund in July-August 2023. Of the 20 million Euros, 10 million Euros is invested by the Ukrainian government and the rest by EC. Both farmers and banks use SAR to apply for loans. Another reason for using SAR is to provide information to the Cabinet Office regarding the types of existing farms through SAR. EC has decided to adopt partial credit guarantee rather than subsidizing interest payment as the mean of financial support for smallholder farmers, based on the track record of the reduction of interest rate to 12% to 13% against the market interest rate of 17 % to 21 % by providing partial credit guarantee when resuming bank lending in the Donbass region, which has been liberated from Russian occupation.

SAR is expected to function as a platform that connects the government and agricultural producers and aims to be a registry that collectively manages agricultural producers. Registration in the SAR is based on the intention of the agricultural producers to register, but the FAO points out as an issue that the SAR does not include family farms. On the other hand, FAO and the WB are already using this system, and JICA is welcome to use this system.

(2) United States Agency for International Development (USAID)

The current USAID assistance strategy for Ukraine is the Country Development Cooperation Strategy covering the period from January 2019 to January 2024. Supporting agriculture is targeted to improve the productivity of agricultural SMEs through market institutions, constituting one of the intermediate goals within the inclusive and sustainable market-driven economic growth, which is one of the four development goals. For that purpose, it is stipulated that development of small and medium-sized enterprises, improvement of the legal environment, strengthening of value chains, and utilization of resources are necessary. Based on the recognition that small and medium-sized agricultural enterprises are encumbered by large-scale agro-holdings in Ukrainian agriculture and that exports to the Russian market have become impossible due to the conflict with Russia, the strategy document underlines its necessity to strengthen the ties with EU and other countries in order to revitalize small and medium size agriculture enterprises and rural economy[ix].

Expansion of inclusive and innovative finance is also listed as one of the intermediate goals of "Inclusive and Sustainable Market-Driven Economic Growth". As a background, about half of the Ukrainians do not have a bank account and are isolated from the financial system. USAID intends to leverage domestic assets for economic development by creating financial markets for self-help of

farmers, strengthening public trust in the financial and banking system, increasing the inclusion of individuals and businesses in the financial system, and supporting pension reform.

USAID's assistance in the field of financing for agriculture is the Credit for Agriculture Producers Project (hereafter CAP). CAP recognizes that small and medium-sized farmers and independent farmers are outside the financial system and do not receive credit, and that credit unions are the only institutions that can provide financing to these farmers. The aim of this project is to strengthen the credit union, including its operating environment, so that it can meet the funding needs of these farmers. For this reason, the project aims to comprehensively strengthen Ukrainian credit unions by strengthening their legal environment, lending capacity, and by providing financing sources and guaranteeing debts. It was originally scheduled to implement for four years from August 2016, but due to the spread of COVID-19 and the subsequent invasion by Russia, the deadline has been extended twice, and the current implementation continues up to September 2024. Table B2.5.13 shows the objectives, specific activities and results of the six components that make up the CAP. CAP is implemented by the World Council of Credit Unions by utilizing its international network.

Table B2.5.13 Objectives, Activities and Outcomes of Each Component of CAP

Purpose of the component	Activity	Achievements so far
Development of legal and regulatory environment	While respecting the nature of credit unions, making their position in the financial market on a par with other financial institutions by improving the legal background and regulatory environment of credit unions. Enact a new credit union law.	Enactment of the new credit union law in June 2021, transfer of the credit union regulatory authority from the State Securities and Stock Commission to NBU, presentation of the future vision of credit unions by NBU, Consultations and lobbying for introduction of a deposit guarantee system for credit unions and amendments to financial services application clauses in Annex VII-2 of the Association Agreement with the EU.
Collaboration between two credit union associations	Formulate and implement policies to strengthen the position of credit unions in the financial sector and expand service provision by credit unions through strengthening mutual cooperation between the two credit union associations in Ukraine.	Submission of proposals and recommendations etc. to NBU and the Ukrainian government which are regulatory authorities, Lobbying for Revision of the Credit Union Law in 2021, Exemption from EU Capital Requirement Directive IV, Support for Member Credit Unions.
Improving services provided to credit unions by two credit union associations	Strengthen the capacity of credit union associations to better serve their member credit unions.	Creation of core banking system.
Expanding Agricultural Financing	Strengthen the lending capacity and expand lending for agriculture and agribusiness for a part of participating credit unions.	Introducing an application that simplifies borrowing procedures for beneficiaries, Launch of websites for each credit union, introduction of value chain financing, support for female entrepreneurs, and expansion of loans for farmers.
Mobilizing liquidity and financial soundness of credit unions	By increasing deposits in credit unions, demonstrate the financial soundness necessary to overcome the liquidity challenges faced by credit unions.	Loan source provided by Worldwide Foundation for Credit Union.
Support implementation of USAID DCA Loan Guarantees	Adapt credit union financial products and financing methods to better meet farmers' needs by introducing loan portfolio guarantees to increase DCA's agricultural lending. In addition, the results and lessons learned will be passed on to other credit unions.	Portfolio guarantees was canceled due to lower-than-expected demand. Based on this experience, a liquidity fund was created as an alternative to guarantees.

Source: Prepared by the survey team based on USAID materials

The locations of the credit unions supported by CAP are as follows. Project member credit unions are 21 as of October 2022. The circle indicates the location of the credit unions: the blue circle indicates the credit union that is supported by CAP, the black circle indicates the credit union that is outside the administrative jurisdiction of the Ukrainian government, the red circle indicates the location of the credit union based in the combat area, and the gray color indicates the location of the affiliated credit union.

Figure B2.5.2 Location of credit unions covered by the CAP project

Source: USAID/Worldwide Council for Credit Union, Quarterly Update, Oct-Dec 2022, Issue No.9

After Russia's invasion of Ukraine, the creation of a liquidity fund to support borrowers who had difficulty repaying their debts and the free distribution of diesel oil were implemented as temporary relief measures under the project.

(3) The World Bank (WB)

The financing strategy of WB is summarized as the Country Partnership Framework (CPF), in which candidate projects are selected. The current CPF covers the period from 2017 to 2021, and no successor CPF has been announced at this time.

The CPF aims to achieve sustainable and inclusive economic development in the wake of economic stagnation that lasted for about a decade and economic crisis caused by the fighting with pro-Russian forces in the Donetsk and Luhansk regions in 2014-2015. The CPF has four pillars: (1) better governance, anti-corruption measures, citizen’s engagement, (2) enhancement of market function, (3) fiscal and financial sustainability, and (4) efficient, effective, and inclusive service delivery. Of these, the agricultural sector is concerned with (2) enhancement of market functions, and the financial sector is concerned with (3) fiscal and financial sustainability. Land reform is taken up as a pillar of policy items related to the agricultural sector in pillar (2) enhancement of market functions. Due to inadequacies in land registration, the absence of a properly functioning land market, and unregistered state-owned farmland becoming a hotbed for opaque land transactions, and in anticipation of the lifting of ban on land transactions which was expected at the time the CPF was formulated, CPF said land reform would make land transactions more transparent thereby contributes to rural development. CPF also includes support for development of agricultural market infrastructure by private sector, crop receipts, review of

irrigation demand, capacity building of irrigation associations, improvement of agricultural warehouses and development of agribusiness.

In the financial sector, CPF aims to stabilize the financial sector and reform the financial market, and work to improve deep-rooted structural problems such as long-established human relationship-based lending, weak financial supervisory functions, and underdeveloped financial infrastructure. The plan also includes developing medium- to long-term financing and investment finance through investments and loans by IFC, fostering the local financial market through strengthening the corporate governance of state-owned bank and privatization.

Table B2.5.14 lists loans to agriculture sector granted during the CPF period, and Table B2.5.15 lists the same for financial sector.

Table B2.5.14 WB Loans for the Agriculture Sector

Approval date	Project name	Amount (US$)	Content
November 6, 2020	Eastern Ukraine: Reconnect, Recover, Revitalize (3R) Project	100,000,000	Rehabilitation of access roads to rural markets in the Luhansk region, establishment of agricultural hubs, construction of storage facilities, strengthening of marketing capabilities of small and medium-sized grain farmers, food safety testing of agricultural products, improvement of services, self-sufficiency of fruits and vegetables. expansion of production and sales channels, restoration of trust and dialogue between the government and citizens
June 26, 2020	Economic Recovery Development Policy Loan	350,000,000	(1) Fostering de-monopolization and anti-corruption organizations, (2) strengthening of land and credit markets, and (3) strengthening of social safety nets.
May 24, 2019	Accelerating Private Investment in Agriculture Program	200,000,000	Alleviating barriers to increase private sector participation in agricultural SMEs
December 18, 2018	Ukraine Policy Based Guarantee	750,000,000	(1) Enhancing the competitiveness of private companies through land market and financial sector reforms; (2) Promoting sustainable and effective public services related to pensions, social insurance and health (3) Improving governance through anticorruption institution and tax administration reform

Source: Prepared by the survey team from the WB website

Table B2.5.15 WB Loans for the Financial Sector

Approval date	Project name	Amount (US$)	Content
March 7, 2022	Financing of Recovery from Economic Emergency Ukraine Supplemental Development Policy Loan	489,450,000	Fostering de-monopolization and anticorruption institutions, strengthening of land and credit markets (amendment of the Land Law to enable the sale of land, enhancement of transparency through improved access to cadastral data, linking cadaster and registry, approval of the bill on handling of NPLs by state-owned banks, strengthening of the regulatory framework for non-bank financial institutions), strengthening of the social safety net
December 17, 2021	Second Economic Recovery Development Policy Loan	349,500,000	Fostering de-monopolizations and anticorruption institutions, strengthening of land and credit markets, and strengthening of social safety nets
May 28, 2021	Ukraine Access to Long Term Finance COVID-19 Additional Financing	100,000,000	Improved access to long-term financing for export-oriented SMEs through Ukreximbank (working capital, investment financing)
May 2, 2017	Access to Long Term Finance	150,000,000	Improved access to long-term financing for export-oriented SMEs through Ukreximbank (working capital, investment financing)

Source: Prepared by the survey team from the WB website

In the agricultural sector, it can be seen that WB has consistently provided institutional support for land reform, development of land registers, and enhancement of transparency in the land market in line with the CPF. In terms of assistance to the financial sector, WB also supports the land reform, in addition to the provision of funds to export-oriented SMEs and strengthening market surveillance mechanism through resolving banks' non-performing loans and tightening of regulations on non-bank financial institutions.

Among the four projects listed in Table B2.5.14, the one that is still under implementation is the Accelerating Private Sector Investment in Agriculture Program. The project is a loan called "program loans for results" to advance institutional reforms to encourage private investment in the agricultural sector[x]. The policy items linked to the program's outcome areas and loan disbursements are shown in Table B2.5.16.

Having been approved in 2019, the loan was restructured twice due to delays in procedures on the Ukrainian side and changes in the ministries and agencies in charge. After those restructurings, the program started and disbursement from the loan also began. But due to the Russian invasion, the Ukrainian government requested a further restructuring of the program in October 2022, and the purpose and content of the program have been changed further.

Initially, the aim of the program was to "alleviate selected constraints to expand activities of small and medium-sized enterprises in the agricultural input and output markets". Since the start of the Russian

invasion, "support for the recovery of the war-affected agricultural production." was added. Consequently, the contents of the program were shifted from the one of mid- to long-term which emphasizes on the efficiency of government assistance to farmers, ensuring transparency, sanitation control of export agricultural products, strengthening border trade, and improving the efficiency of the land market to the one of short term which is to avoid short-term disruption of the production cycle.

Along with this change, the program will newly finance (1) provision of funds for subsidizing interest on Affordable Loans 5-7-9%, and (2) provision of free investment funds for horticultural crops, and 3) grant investment funds for irrigation associations, and 4) investment in the partial risk guarantee fund. Those will be done jointly with WB loans and government budgets.

For this reason, the WB has added "support for the recovery of sustainable agricultural production" as a policy item linked to the disbursement under the loan and abolished those policy items that were yet to be achieved at the time of program restructuring. In addition, as indicators are linked to the disbursement of loans under this policy item, the following two items were added, namely "At least 4,000 agricultural producers benefiting from Affordable Loans 5-7-9% " and "the 2023 National Budget includes the budget lines for Interest Subsidy Program for Affordable Loans 5-7-9%, horticulture support program, efficient irrigation management through water users associations, and funds for partial risk guarantee funds"[xi]. Loan allocations were US$148 million for the former and US$19.5 million for the latter, totaling US$167.5 million allocated to new policy items linked to disbursement.

Table B2.5.16 Policy Items Linked to Outcome and Loan Disbursements for "Accelerating Private Investment in Agriculture Programs" (Initial)

Area of achievement	Policy Item Linked to Loan Disbursement (DLI)	Expected results
Increasing competitiveness in input market	Improving efficiency and targeting of state support in agriculture (DLI-1)	(1) Enhancement of planning capacity for medium-term budget, (2) capacity building of MAPF staff in terms of program design, management, budget planning, and policy analysis, (3) adoption of Key Performance Indicators for evaluation of effectiveness of budget execution, (4) a scalable computerized registry of the recipient of state support, (5) implementation of information provision campaign of national support programs available for small and medium-sized farmers
	Improving functioning of land market (DLI-2)	(1) registration of all state-owned land; (2) increased revenues for local governments through land auctions, land rents and reliable collection of land taxes; (3) creation of public orthophoto and topographical maps; (4) Providing free legal advice in written form with reliable and clear information
	Inventory and registration of state-owned land (Sub DLI2.1)	
	Improving transparency of land auctions (Sub DLI 2.2)	
	Improving protection of rights in Land, mortgage market (Sub DLI 2.3)	
	Strengthening the Free Legal Assistance System (Sub DLI 2.4)	

Area of achievement	Policy Item Linked to Loan Disbursement (DLI)	Expected results
Strengthening links of SMEs and farmers with export markets	Promoting access to export markets for small and medium-sized agricultural businesses (DLI 3)	(1) Amendment of regulations and laws to ensure more reliable management of traceability of products of animal origin, (2) establishment and operationalization of an interactive information system on the requirements of export markets and food safety, (3) at least 60% of the newly registered livestock product manufacturers as exporters are SMEs, (4) installation of 10 border control points, (5) realization of live animal exports worth at least US $ 58 million.
	Facilitating access to export markets for SMEs (Sub DLI 3.1)	
	Facilitation of cross-border trade (Sub DLI 3.2)	

Source: Prepared by the survey team based on the WB report

(4) International Finance Corporation (IFC)

IFC's financing is based on a triennial Strategy and Business Outlook and an annual budget. Strategy and Business Perspective is IFC 's own strategic document, but as a member of the World Bank Group, it has been prepared in line with the WB's CPF. The Strategy and Business Outlook will be reviewed annually even during the targeted period. The budget proposals to materialize the "Strategy and Business Outlook" are allocated from the perspective of policy items, target sectors, and target regions. At the time of this research, the basic strategy document was "Strategy and Business Outlook Update FY23-25". The document presents regional policies, and as one of the specific items of the pillars under "inclusiveness" policy, it refers to the provision of loans to the agricultural sector to Ukraine.

Table B2.5.17 summarizes IFC 's assistance strategy to Ukraine in the past Strategy and Business Outlook. The strategies drawn in the "Strategy and Business Outlook" are formulated for each region, and both the policies common to across the region and those for individual country in the relevant region are described. Consequently, the one for Ukraine is under both policies, one for Europe and Central Asia and the other for Ukraine. In the Europe/Central Asia region, support for financial sector has consistently been implemented, centered on improving access to finance. Unlike the WB's CPS, IFC's strategy document does not include specific project names because the beneficiary of financing is the private sector.

Table B2.5.17 Financial and agricultural sector support to Europe/Central Asia and Ukraine under "Strategy and business support"

Target year for strategy and business outlook	Support items related to Europe/Central Asia and Ukraine
FY16-18	Improving access to finance and developing local capital markets (Europe and Central Asia)
FY17-19	Development of local capital market (Europe and Central Asia), Stable supply of gas and privatization of power plants and distribution facilities (Ukraine)
FY18-20	Developing capital markets to facilitate local currency financing, recapitalization of systemic banks, distressed asset resolution, improving access to finance for underserved groups, support to agriculture sector (Europe and Central Asia)
FY19-21	Strengthening financial sector (Europe), privatizing state-owned enterprises (Ukraine)
FY20-22	Improving access to finance (Europe/Central Asia), Developing domestic capital markets including local currency lending, Privatizing state-owned enterprises (Ukraine)
FY21-23	Improving access to finance (Europe/Central Asia), strengthening cooperation with WB on agriculture and state enterprise reform (Ukraine)
FY22-24	Bank privatization, food production, agri-finance and food retail (Europe and Central Asia)
FY23-25	Agriculture finance (Europe region), agriculture finance (Ukraine)

Source: Prepared by the survey team from IFC website

IFC's loans to Ukrainian agricultural sector after 2004 are shown in Table B2.5.18.

Table B2.5.18 IFC's finance to agriculture sector after 2004

Loan approval date	Borrower	Loan amount	Use of funds	Borrower's economic activity
2022/12/15	InVivo Group	Euro 65 million	Working capital	Subsidiary of the French Soufflet Group, malting, milling, bakery, confectionery, horticulture, retail, cereal, wine export
2021/02/19	JV LLC Nyva Pereyaslavshchyny	USD 20 million	Expansion of pig breeding facilities	Pig farming enterprises (11 pig farms), grain production (23,000 ha of cultivated land), pig farming, slaughter, meat processing
2020/06/23	JV LLC Nyva Pereyaslavshchyny	USD 20 million	Working capital	mentioned above
2018/05/31	FE Integrated Agrosystems	USD 17 million	Expansion of production items, expansion of exports	Tomato paste manufacturing, tomato production enterprise (3 factories, 750,000 tons of seasonal production, 2 sowing greenhouses, 25,000 ha of irrigated farmland lease),
2018/04/25	JV LLC Nyva Pereyaslavshchyny	USD 12.5 million	Expansion of pig breeding facilities and expansion of meat processing capacity	mentioned above
2018/03/23	Astrata-Kyiv, TOV	USD 30 million	Reduction of waste, water consumption, gas consumption, and CO2 emissions	Grains, oilseeds, sugar, milk production, soybean crushing (for feed, oil)

Loan approval date	Borrower	Loan amount	Use of funds	Borrower's economic activity
2017/05/30	Nibulon Agricultural LLC	USD 90 million	Expansion of facilities to increase sales volume	Cereals, oilseed production and export
2016/05/31	Astrata-Kyiv, TOV	USD 25 million	Working capital for grain purchases from farmers	mentioned above
2016/05/26	FE Integrated Agrosystems	USD 10 million	Refinancing short-term debt and increasing working capital	mentioned above
2015/09/25	Astrata-Kyiv, TOV	USD 35 million	Working capital for expanding soybean stock	mentioned above
2015/06/29	Bayer Farmer RSF	USD 30 million	Accounts receivable guarantee	Supply of insecticides, herbicides and fungicides, subsidiary of Bayer AG
2014/12/01	JV LLC Nyva Pereyaslavshchyny	USD 25 million	Capacity expansion and medium-term debt refinancing	
2014/05/29	Myronivsky Khiboprodukt, Publichne AT	USD 250 million	Capacity expansion and refinancing of Eurobonds due in 2015	Poultry farming (integrated production)
2013/12/16	Industrial Milk Company SA	USD 50 million	Expansion of cultivated land by 185,000 ha, enhancement of savings capacity, purchase of agricultural machinery and infrastructure, enhancement of working capital	Raw milk, beef, corn, sunflowers, soybeans, wheat, livestock agricultural products, sugar beet, rye, potato production
2013/12/23	MRIYA Agrokholdyng, TOV	USD 60 million	Working capital for purchase of production inputs	Wheat, barley, sugar beet, rapeseed, potato and other grain production, grain storage
2013/05/31	Axzon	Euro 54 million	Pig farm construction, farmland purchase	Pig farming, meat processing
2012/12/13	Myronivsky Khiboprodukt, Publichne AT	USD 50 million	Clearing 120,000 ha of land	mentioned above
2012/10/30	FE Integrated Agrosystems	USD 20 million	Refinancing short-term debt and increasing working capital	mentioned above
2012/08/13	Astrata-Kyiv, TOV	USD 50 million	Soybean crusher, biomass facility construction, farmland expansion, agricultural machinery, purchase of storage facilities, procurement of dairy infrastructure, modernization of sugar production and storage facilities	mentioned above
2012/03/28	Bayer Farmer RSF	USD 17.5 million	Accounts receivable guarantee	mentioned above
2015/11/05	MRIYA Agrokholdyng, TOV	USD 5 million	Improve efficiency of production processes and inputs	mentioned above
2011/05/19	MRIYA Agrokholdyng, TOV	USD 90 million	Working capital for purchase of production inputs	mentioned above

Loan approval date	Borrower	Loan amount	Use of funds	Borrower's economic activity
2011/04/18	Bayer Farmer RSF	USD 70 million	Loans to farmers, debt guarantees for such loans	mentioned above
2010/06/07	Myronivsky Khiboprodukt, Publichne AT	USD 50 million, PCG USD 18 million	Clearing 120,000 ha of land and purchasing agricultural machinery	mentioned above
2010/06/08	Globino Meat-Processing Plan LLC	USD 25 million	Expand raw meat and processed meat production capacity, expand pig farms and slaughterhouses, expand cheese and butter production capacity	Integrated meat, butter, cheese production, pig farming, slaughterhouses
2010/03/29	MRIYA Agrokholdyng , TOV	USD 25 million, Warrants USD 25 million	Construction of grain silos, purchase of agricultural machinery, purchase of leasehold rights, working capital	mentioned above
2009/06/17	Soufflet Finances	USD 25 million	New World Grain working capital	Wheat and barley production for parent company Soufflet and ABB
2008/10/23	Delta Wilmar CIS Limited	USD 45 million	Capacity building of plants and surrounding infrastructure	Manufacture of coconut oil and shortening
2007/10/01	ING Bank NV	Euro 10 million	Funds for purchasing emission rights	Bank
2007/05/21	Kontsern Khibprom, Publichne AT	USD 30 million	Expansion of bread production capacity, modernization of existing bakeries, renewal of retail network, construction of grain warehouses and mills, refinancing of short-term debt	Bread and confectionery manufacturing
2006/09/25	Sandra TOV	USD 20 million	Introduced new packaging, started production of baby food, strengthened fruit processing and condensing machine capacity, strengthened retail network, increased working capital	Juice and nectar production
2006/06/29	Delta Wilmar CIS Limited	USD 17.5 million	Construction of a 1,500 ton/day palm crude oil refinery	mentioned above
2006/02/03	Closed Joint Stock Company Rise	USD 10 million	Refinancing debt maturing in 2006	Agricultural input production, agricultural machinery/spare parts supply
2006/03/10	Savservice MOVA TOV	USD 10 million	Investment in new warehouse construction, purchase and renovation of storage centers, transportation equipment, and information management systems	Warehousing and transportation of consumables

Loan approval date	Borrower	Loan amount	Use of funds	Borrower's economic activity
2005/03/24	Myronivsky Khiboprodukt, Publichne AT	USD 80 million	Expansion and new construction of soybean and sunflower crusher, expansion of feed crusher, expansion of processing plant, expansion of existing poultry farming facility, construction of new slaughterhouse, expansion of feed/egg/product transport facility, working capital	mentioned above
2004/06/24	Sandra TOV	USD 10 million	Modernization and expansion of existing juice and puree factories, modernization of puree processing facilities, expansion of retail network, working capital	mentioned above

Source: Prepared by the survey team from IFC website

Table B2.5.19 shows the publicly available data on technical assistance provided by IFC to the agricultural sector. IFC is supporting the introduction of crop receipts and agricultural insurance.

Table B2.5.19 IFC Technical Assistance for the Agriculture Sector

Approval Date	Project name	Contents
2018/1/29	Ukraine Dairy SC	Support modernizing the processing procedure to 600 dairy associations with 40,000 small dairy farmers by improving the access to inputs, services and finance.
2013/11/20	Ukraine Crop Receipt Project	Setting up an institutional mechanism to utilize crop receipt as collateral for both financial institution and agricultural input suppliers
2010/9/16	Ukraine Agri-finance Project	Developing agricultural credit risk management tools for banks, developing bank loans and loan products for agricultural loans, and training of bank loan officers to use these tools.
2005/12/6	Ukraine Agri-Insurance Development Project	Providing advisory services to non-banks to develop agricultural insurance.

Source: Prepared by the survey team from IFC website

(5) European Bank for Reconstruction and Development (EBRD)

The current strategy of EBRD is described in the chapter “5.3 Other donors (EBRD, EIB, WB, IMF, etc.)" of the previous survey.

EBRD has committed 93 loans to the agricultural sector since March 1998 (11 of which were canceled). Recent financing results are shown in Table B2.5.20. All of these loans are capital investment and working capital loans for large-scale agricultural enterprises.

Table B2.5.20 EBRD loans in the agricultural sector (since 2020)

Loan approval date	Borrower	Loan amount	Use of funds	Borrower's economic activity
2022/12/14	MHP Food Trading LLC	USD 90 million	Seasonal working capital for edible oil crushing plant	UAE company subsidiary Cooking oil production
2022/4/22	MHP PRJSC	Euro 24 million	Working capital for grain cultivation	UAE company subsidiary, grain, poultry, livestock feed production
2022/2/23	Farm Enterprise Integrated Agrosystems	Euro 17.8 million	4 Tomato processing factory, greenhouse construction, tomato processing machinery, agricultural machinery, procurement of eco-friendly plastic storage containers for tomato paste	Tomato paste production
2021/11/9	Agrokompleks Zelena Dolyna LLC	Euro 15 million	Construction of EU standard compliant cattle farm, acquisition of land, enhancement of grain silo storage, purchase of agricultural machinery	Vertically integrated company of grain production, cattle farming and sugar production
2021/8/10	Ukrokya LLC	Euro 16 million	Capital investment, working capital	Sunflower oil production
2021/6/29	Nibulon SA	USD 30 million	seasonal working capital	Integrated production and export of grains and oilseeds
2021/2/25	Kernel Holding SA	USD 80 million	Working capital for business operations	A vertically integrated company in oilseeds, grain trade, grain farming, grain storage and transportation
2020/10/13	Enzym PJSC	Euro 7 million	Construction of yeast product production facility, expansion of fermentation capacity, construction of water purification facility	Yeast production
2020/7/28	organic systems	Euro 10 million	Working capital during COVID-19 outbreak	Subsidiary of Agrofusion Group
2020/6/30	Nibulon Ltd.	USD 27 million	Working capital during COVID-19 outbreak	Integrated production and export of grains and oilseeds
2020/6/30	Kormotech LLC	UAH 112.6 million	Working capital during COVID-19 outbreak	Pet food production, subsidiary of Vengast Investment Ltd in Cyprus
2020/7/23	Novus Ukraine LLC	USD 82,5 million	Expansion of sales outlets, modernization of logistics infrastructure, construction of logistics centers	Supermarket chain
2020/4/23	Silpo-Food LLC	USD 60 million	Group retail store renovation	Food retailer Fozzy Group subsidiary
2020/1/14	Lantmannen Axa PJSC	Euro 3 million	Working capital	Breakfast cereal manufacturing, a subsidiary of a Swedish cooperative

Source: Prepared by the survey team from EBRD website

Table B2.5.21 shows the publicly available data on technical cooperation projects provided by EBRD to the agricultural sector in the past. Support is provided for construction of agricultural value chains and introduction of warehouse receipts.

Table B2.5.21 EBRD 's agricultural technical cooperation projects

Date of approval	Project name	Contents
2021/9/8	Digital Knowledge Management and Skills Transfer in the Private Sector	Digitalization of knowledge management for newly employed staff of private companies and training of high-quality technical experts for agricultural companies through skill transfer

2020/12/18	Project Preparation Support Program for Agribusiness Project in Ukraine	Establishment of backward linkage and value chains between local product producers and companies that have a large impact on the local economy, market expansion, job creation, and minimization of environmental impact by production activities (supported by the Japan-EBRD Cooperation Fund)
2019/7/19	A session of Warehouse Receipt System- Primary legal framework and legislation on Warehouse Receipt System	Analysis of legal and regulatory frameworks related to warehouse receipts, presentation of reform direction, revision of existing legal and regulatory frameworks including the introduction of electronic warehouse receipts, drafting of legal and regulatory frameworks including the addition of new provisions
2016/3/30	Project Preparation Support Program for Agribusiness Project in Ukraine	A support for designing a project which strengthen backward linkage of agriculture producers and the food processing industry aiming at to create value chains for utilizing local products to expand the market, and to create employment, and minimize the environmental impact of production activities

Source: Prepared by the survey team from EBRD website

(6) European Investment Bank (EIB)

The EIB's assistance to Ukraine started in 2007 and has been provided under EU's European Neighborhoods Policy and Eastern Partnership Policy. Support to agriculture is one of the targets under the support for small and medium-sized enterprises, which are the main target of support of EIB. Table B2.5.22 shows loans to the agricultural sector supported by the EIB to date.

Table B2.5.22 EIB assistance to Ukraine

Loan approval date	Borrower	Loan amount	Use of funds	Borrower's economic activity
2021/12/22	Epicentr K TOV	Euro 106 million	Procurement of grain silos, agricultural machinery and grain wagons	no mention
2018/12/18～	Kernel Holding SA	Euro 63 million for agricultural sector within	(1) Two grain silos, (2) Construction of grain handling and storage facilities at Chernomorsk Port, (3) Construction of a biomass power	no mention
2017/11/23	Firm Astarta-Kyiv LLC	Euro 36 million	Introduction of IT solution and enlargement of grain and suger storage facilities through the EU InnovFin program	Agro-Industry holding, sugar export
2017/3/31	private	Euro 21 million	New construction of tomato production and processing lines	no mention
2016/12/19	Nibulon	Euro 41 million for agricultural sector within total loan of Euro 71 million	Expansion and modernization of grain storage and transportation facilities	no mention

Source: Prepared by the survey team from EIB website

The EIB 's technical assistance is provided through Eastern Partnership Technical Assistance Trust Fund. Based on the 2018 Annual Report of the Trust Fund, the technical assistance to agriculture sector in Ukraine was provided once in 2017 for project formation of a regional project titled “Agri-food Apex Loan for Georgia, Ukraine and Moldova”.

(7) Federal Republic of Germany

In Germany, the Federal Ministry for Economic Cooperation and Development (BMZ) formulates policies while projects are implemented by the ministry itself as an implementing agency, and its implementing agencies, namely KfW Development Bank (KfW) and the German Agency for International Cooperation (GIZ).

BMZ's support policy for Ukraine is implemented within the framework of EC's European Neighborhood Policy and Eastern Partnership. The contents of the ministry's support currently announced are mainly for emergency response after the invasion by Russia, but it also includes support for SMEs. BMZ's support policy announced on its website does not include a specific support program for the agricultural sector and consequently agricultural companies are considered to be benefited within the framework of supporting SMEs.

As mentioned in the section 2.5.2 Financing for the agricultural sector, (7) Business Development Fund, the KfW has been providing two-step loans through the German-Ukrainian Fund and BDF[xii]. KfW's pillars of assistance strategy to Ukraine also include support for SMEs through financing and interest subsidies, reflecting the policy of BMZ.

KfW's support for agricultural sector financing which does not go through the channel of German-Ukrainian Fund and BDF includes a mezzanine loan of 17.5 million to Public Joint-Stock Company Joint-Stock Bank “Lviv” (PJSC JSB “Lviv”) to finance export-oriented SME agricultural enterprises, which is under implementation. This is the only deal explicitly classified as being the loan to agricultural sector in KfW's published lending history.

In addition to BMZ, the Federal Ministry for Food and Agriculture is carrying out a project entitled German-Ukraine Agricultural Policy Dialogue. This project covers development of laws and regulations in the fields of agricultural policy, agriculture and rural development, advice to land administration, research in the field of agriculture, and agricultural policy dialogue between Germany and Ukraine. Improvement in access to finance of farmers is not explicitly referred in the scope of works.

GIZ supports SMEs through training programs for business managers.

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[i]The Neighborhood Development International Cooperation Instrument brings several previously separate regional funding mechanisms together. It has functions including grants, blended finance and debt guarantees.
[ii]C(2022)1783 Commission Implementation Decision of 16.3.2022 on the financing of the individual measure in favor of Ukraine for 2022
[iii]April 12th, July 1st, November 29th
[iv]Action Document for “Reducing vulnerability and enhancing food security through support to conflict affected population and agricultural production in Ukraine”, OPSYS business reference NDICI-GEO-NEAR/2022/ACT 61256
[v]COM(2022)233 final Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions: Ukraine Relief and Reconstruction
[vi]ENI 2017/C(2017) 8264 Commission Implementation Decision of 11.12.2017 adopting a Single Support Framework for European Union support to Ukraine for the period of 2018-2020, Annex 1 - “Programming of European Neighborhood Instrument (ENI) 201 7 -2020 , Single Support Framework for EU Support to Ukraine (2018-2020)”
[vii] This statement is based on “ Action Document for EU Support to agriculture and small farm development in Ukraine” CRIS number ENI/2020/042-345 .
[viii]April 5, 2023 Hearing from Mr. Christian Hell, Operations Sector Manager, EU Delegation to Ukraine .
[ix]USAID Country Development Cooperation Strategy 2019-2024, p.29
[x]A financing method introduced by the World Bank in 2012. A method of disbursing loans when pre-agreed program objectives are met to strengthen institutions and processes. Loans are disbursed based on outcomes leading to disbursements and the achievement of indicators for judging those outcomes.

[xi] Restructuring Paper on a proposed program restructuring of Accelerating Private Investment in Agriculture Program approved on May 24, 2019, Report No. RES52851, February 16, 2023, paragraph 3 1

[xii]For KfW Development Bank's loan to BDF, see Table 7-1 BDF 's ongoing/planned projects in the previous survey.

Annex 2.6.1

Gender-related Changes and Challenges Arising Due to Decrease in Male Workers Due to War and Nomadic Activities

Annex 2.6.1 Gender-related Changes and Challenges Arising Due to Decrease in Male Workers Due to War and Nomadic Activities

General

As mentioned in the documents below, it's a phenomenon observed in many countries that "in situations where male workers are absent due to conflicts, women take up jobs that were once the domain of men." This is believed to have similar impacts in Ukraine currently and going forward.

A negative aspect of this is, naturally, the increased burden on women. On the other hand, the fixed gender role distribution and gender stereotypes in the relevant society are reevaluated, and women's decision-making authority expands, which is a positive aspect. Therefore, it's crucial to consider the negative aspects carefully while seizing this as a good opportunity for Built Back Better, and to strengthen the positive aspects.

【Conflict and Gender Overview】

“Gender, Conflict, and Development “

World Bank Document

Chapter 7 of this document, "Gender and Work: Creating Equal Labor Market Opportunities," mentions the change in agricultural role distribution. Also, during conflict, women have to engage in productive activities in addition to their unpaid care work (housework and childcare), so the need to cope with the increased burden is mentioned.

(https://documents1.worldbank.org/curated/en/514831468763468688/pdf/30494.pdf)

【Yemen Case】

“From the Ground Up: Gender and conflict analysis in Yemen (openrepository.com)”

Section "3 GENDER ROLES AND RELATIONS" mentions that due to the impact of conflict, women have taken up jobs that were formerly done by men.

(https://oxfamilibrary.openrepository.com/bitstream/handle/10546/620112/rr-yemen-gender-conflict-analysis-201016-en.pdf;jsessionid=3044F87B5702955C1DD712A8821943C8?sequence=1)

【Male Nomadism】

“Exploring the effects of migration on smallholder farm households in Kenya and Burkina Faso

Exploring_Crossland_2021.pdf (cgiar.org)“

In the sense that men are absent and women take up men's jobs, male nomadism has a similar impact. This is a case in Kenya.

The main burden faced by households with nomadic members is the loss of farm labor. It's rare for nomads to return home specifically to help on the farm, as a result, women have taken over activities that their sons or husbands used to help with, such as cattle fencing and cultivation. On a positive note, it's mentioned that with men gone, the number of cases where women make decisions regarding farming has increased.

(ttps://cgspace.cgiar.org/bitstream/handle/10568/116715/Exploring_Crossland_2021.pdf)

【Philippine Mindanao Case】

"Gender and Conflict in Mindanao (ndi.org)"
Section III. The Impact of the Conflict on! Women, and on Gender Dynamics in Mindanao mentions a change in gender roles.
(https://www.ndi.org/sites/default/files/Gender%20and%20Conflict%20in%20Mindanao.pdf)

【Increase in Female-Headed Households due to Conflict】

"Mainstreaming Gender in Conflict Analysis"
World Bank Document
Appendix A: Armed Conflict and the "Feminization of Poverty"1 introduces various country cases. Due to conflict, the number of female-headed households is increasing.
(https://documents1.worldbank.org/curated/en/449571468144266512/pdf/351500Mainstreaming0gender0WP3301Public1.pdf)

Annex 3.2.1

Miuntes of Action Plan Preparation in 2nd Invitation program

3.2.1 Minutes of action plan preparation

In the 2nd Japan invitation program, two teams (irrigation and horticulture) prepared an action plan for the post-war reconstruction in Ukraine. The teams also made a presentation at JICA headquarters.

The following is a summary of the action plan prepared by the invitees. Although there is a high need for support, JICA cooperation implementation are undecided, and the action plans are basically unimplemented by Ukraine government.

Table 3.2.1 Action Plan (Irrigation team)

Action plan (Irrigation team)	
Theme1 Recovery of irrigation facilities	
Project Designing	
1. Target area	
I. On the controlled territory 1) Odessa region 2) Poltava region 3) Dnipropetrovsk region 4) Cherkasy region 5) Zhytomyr region 6) Mykoxlaiv region	II. Occupied territories
2. Strategic infrastructure projects	
1) Survey on status of overall agriculture 2) Demining 3) Examination on status of irrigation systems 4) Prioritizing of renovation and reconstruction of irrigation systems 5) Determining of technical support for building / renovation / reconstruction - Development & evaluation of systems of Odessa region for determining the most profitable project (from point of technical & economical evaluation)	
3. Construction of facilities	
• Building of the irrigation system on the separate territory of the individual farmer (Providing state support) • Building of hydro-melioration infrastructure involving technical supervising from Japanese experts • Involvement of Japanese engineering companies, technologies for energy saving equipment	
Theme2 Water Management / Operation & Maintenance	
Short term - Grant help/support for changing equipment (for continuous use of irrigation systems during war) same of USAID Project - Transfer of the part of melioration systems to water-beneficial organizations	
Short-Middle term - Involving Japanese experts working out on qualitive meliorating service: 1) Minimal human resources	

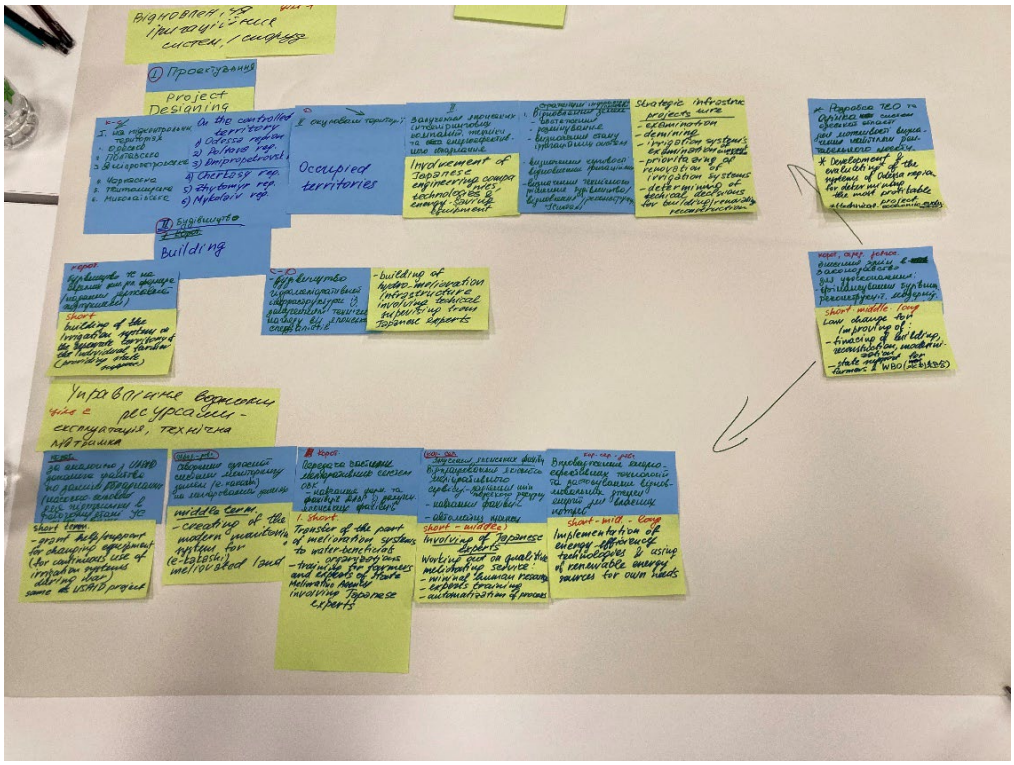
Action plan (Irrigation team)
2) Experts training 3) Automatization of process
Middle term - Creating of the modern monitoring system (ex. e-kakashi) for meliorated land
Short-Middle-Long term - Training for farmers and experts of State Agency of Melioration and Fishery involving Japanese experts. - Implementation of energy efficiency techniques and using of renewable energy sources for own needs
Result of Action Plan discussion（Irrigation team）


Table 3.2.2. Action Plan（Horticulture team）

Action plan (Horticulture team)
Theme1 Farm Management
The government supports: - Subsidies - Soft loan for farm management - Crop insurance for famers (Low subscription costs and coverage increase) - Rental services of farm machinery and equipment

Action plan (Horticulture team)
Improving of quality of products - Agro processing - Horticultural training - Modern storage including cold storage for quality control of dairy products and meat
Soil cleaning - Removal of heavy metals and other harmful substances from farmland soils
Others - Environmental conservation - Livestock support - Participation of youth in agriculture
Theme2 Advanced Agriculture techniques
Modern technology and equipment using - Storage building - Greenhouse building - Provision of refrigeration facilities - Introducing equipment for gardening (blueberry, strawberry etc.) - Seeds: quality, compost, and protection - Digitalization - Expansion of solar & biogas generation
Result of Action Plan discussion（Irrigation team）

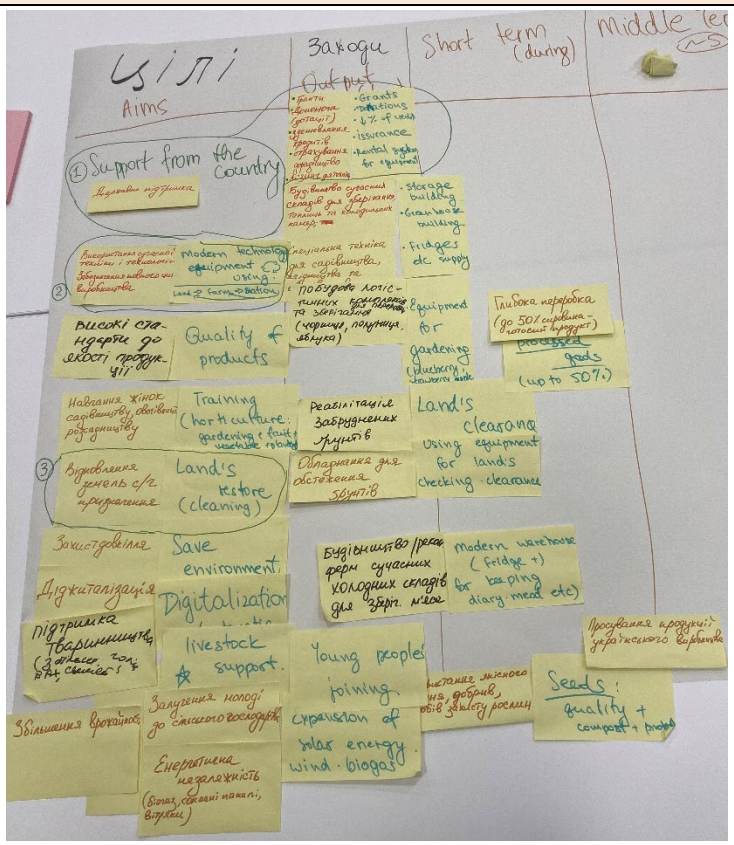
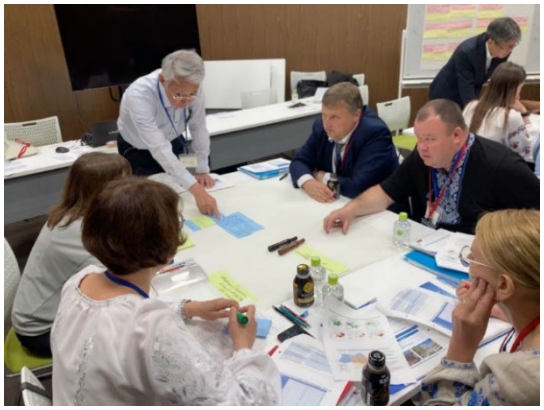
Action plan (Horticulture team)


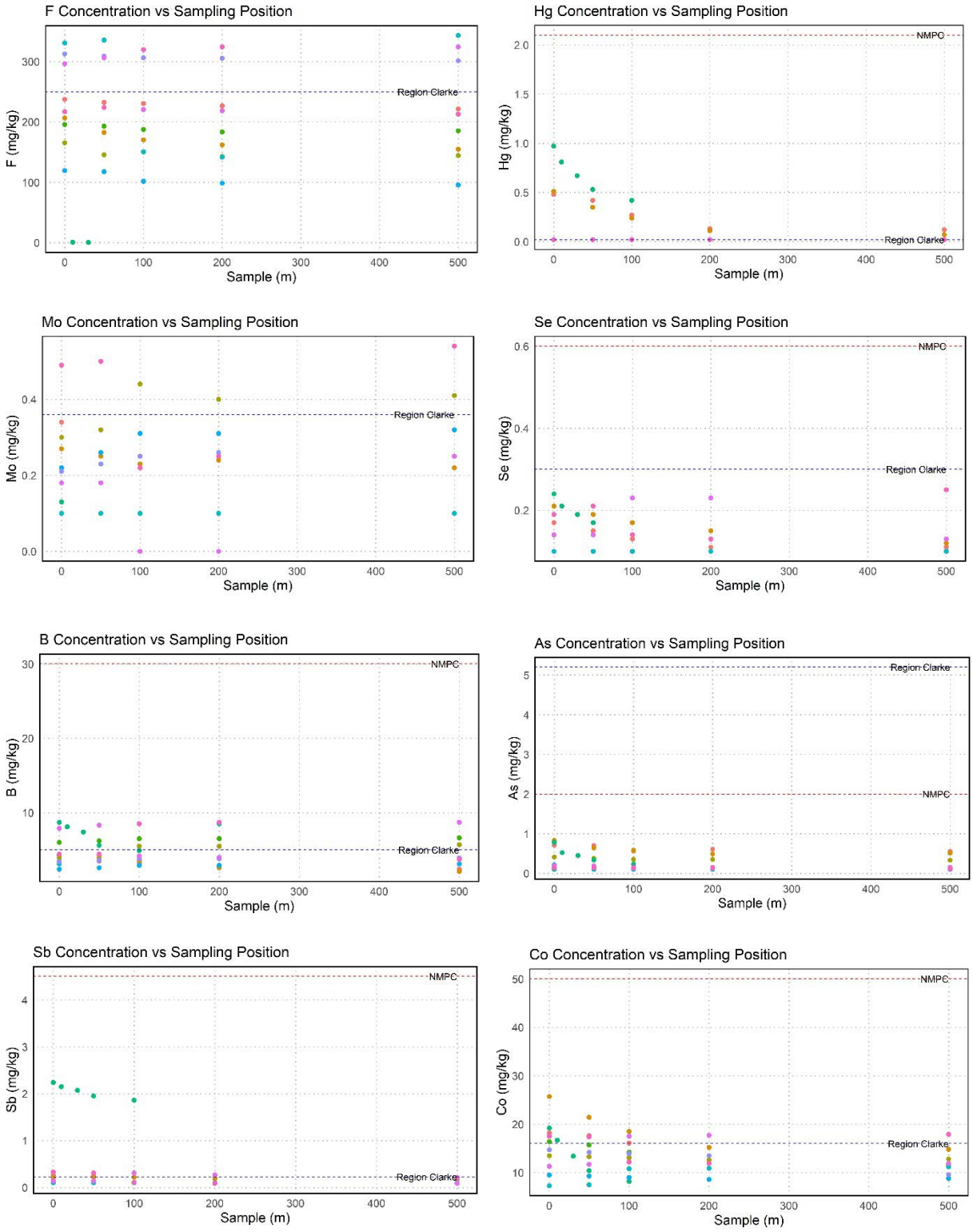
Table 3.2.3 Picture of Action Plan preparation



Annex 3.4.1

Ukraine Soil Analysis

Annex 3.4.1 Ukraine Soil Analysis



** Only the 8 heavy metals which exceed NMPC.*

Figure 1 Distance from Bombing Sites in Each Location and Heavy Metal Concentration in Soil

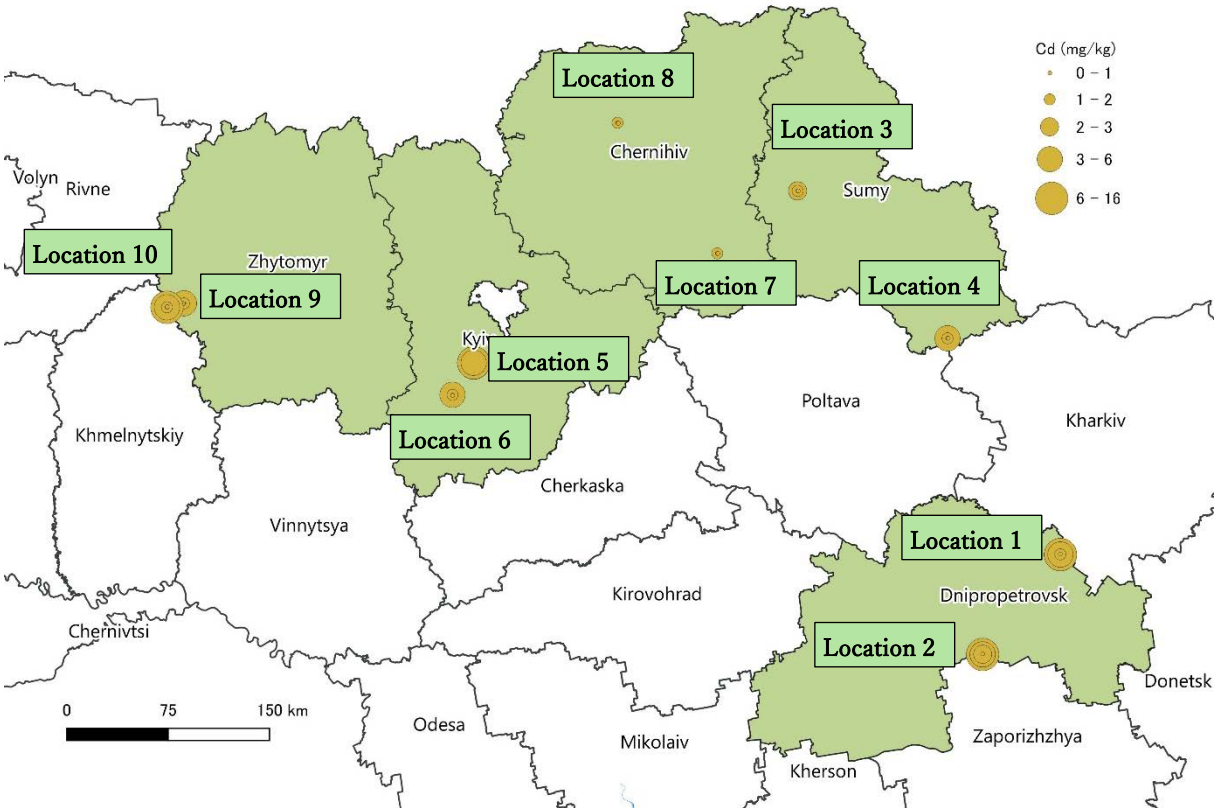


Figure 2 Cd's Contamination at each Location

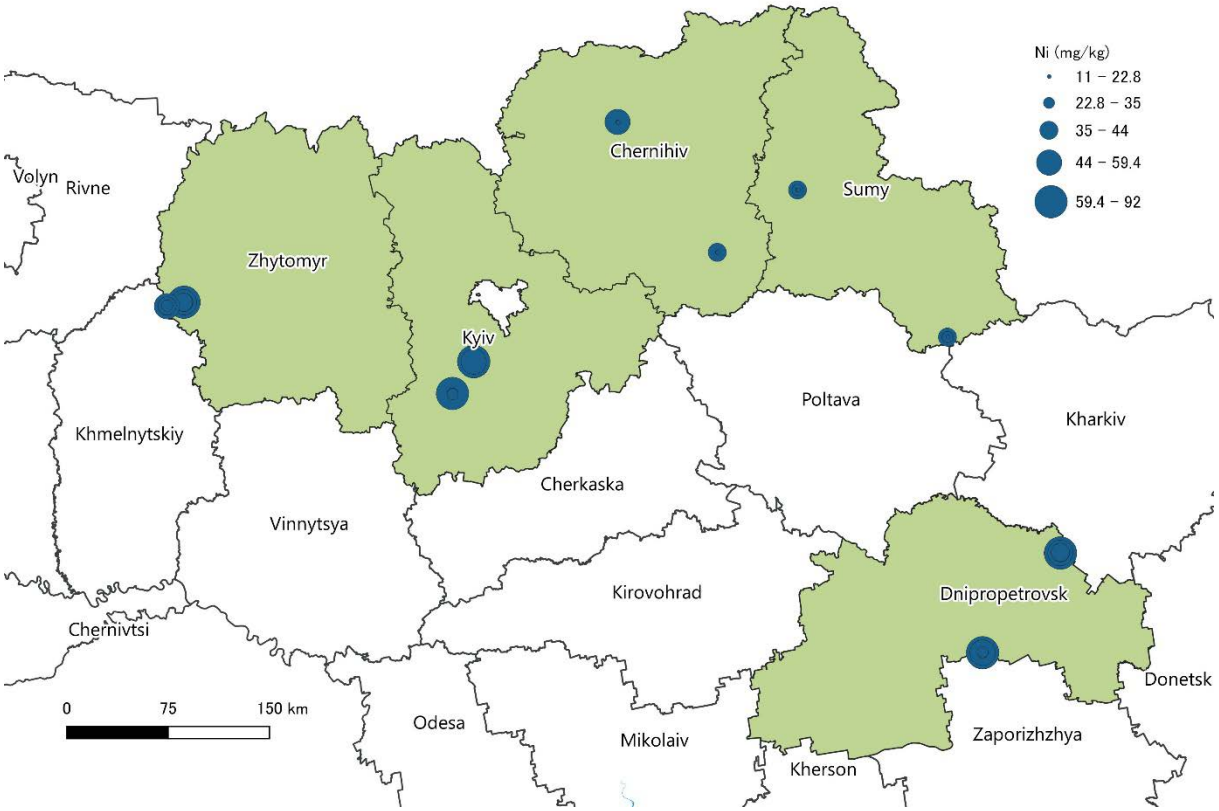


Figure 3 Ni's Contamination at each Location

Figure 4 Zn's Contamination at each Location

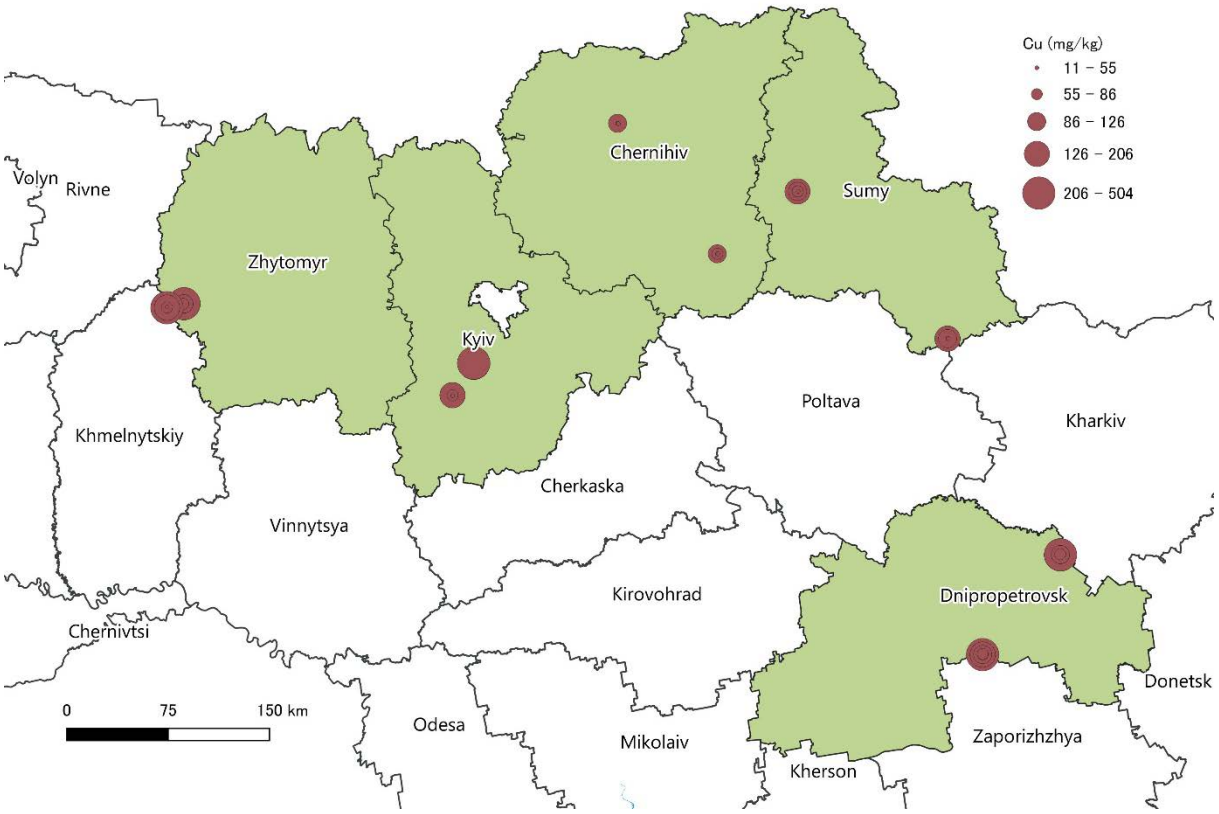


Figure 5 Cu's Contamination at each Location

Figure 6 Cr's Contamination at each Location

Laboratory Summary

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с. Велика Олександрівка, вул. Київський шлях, 115 В
Гаряча лінія: 0 800 300 038
e-mail: office@plt.land сайт: www.PLT.land

Annex 1

The content of heavy metals in soils in the area of the epicenter of the hit

Sample (0 m)	Name of tests and characteristics to be determined,														
	Cd, mg/kg	Cr, mg/kg	Zn, mg/kg	Hg, mg/kg	Se, mg/kg	Pb, mg/kg	As, mg/kg	F, mg/kg	B, mg/kg	Cu, mg/kg	Co, mg/kg	Mn, mg/kg	Ni, mg/kg	Sb, mg/kg	Mo, mg/kg
Location 1: Ukraine, Dnipropetrovsk region, Pavlograd district	12,3	234,2	729,6	0,48	0,17	245,1	0,71	237,6	3,5	331,6	18,2	4987	92,1	0,26	0,34
Location 2 : Ukraine, Dnipropetrovsk region, Synelnykivskyi district	7,5	302,3	587,9	0,51	0,21	224,7	0,83	206,3	4,2	234,8	25,7	4627	74,6	0,21	0,27
Location 3: Ukraine, Sumy region, Konotop district	3,1	118,3	414,6	<0,02	<0,1	131,5	0,41	165,4	3,9	189,4	13,5	1890	43,8	<0,1	0,3
Location 4: Ukraine, Sumy region, Okhtyrka district	3,8	127,5	365,3	<0,02	<0,1	147,6	<0,1	195,6	6	156,4	16,4	2125	35,9	<0,1	<0,1
Location 5: Ukraine, Kyiv region, Vasylkiv district	16,4	211,8	956,8	0,97	0,24	215,9	0,78	0,72*	8,7	504,3	19,2	3012	81,2	2,24	0,13
Location 6: Ukraine, Kyiv region, Bila Tserkva district	4,8	106,4	521,5	0,02	0,1	114,6	0,1	330,7	3,1	205,9	7,3	2054	61,8	0,1	0,1
Location 7: Ukraine, Chernihiv region, Mena district	2,1	87,8	270,9	<0,02	<0,1	70,3	0,21	119,4	2,4	91,3	9,5	976	49,8	<0,1	0,22
Location 8: Ukraine, Chernihiv region, Ichnya district	2,3	95,4	311,5	<0,02	<0,1	86,5	<0,1	312,6	3,4	109,6	14,7	1096	39,8	<0,1	0,21
Location 9: Ukraine, Zhytomyr region, Zvyagel district	6,3	145,2	532,6	0,02	0,14	163,9	0,19	296,4	7,9	287,5	11,3	2743	64,5	0,14	0,18
Location 10: Ukraine, Zhytomyr region, Baranivka district	8,2	166,3	467,6	0,02	0,19	187,4	0,14	216,8	4,4	241,3	17,5	2153	58,7	0,33	0,49

* – indicator of the content of mobile fluorine, for other indicators – gross content

Color	The level of predominance of NMPC
	0.5 NMPC
	0.6–1.0 NMPC
	1.1–1.5 NMPC
	1.6–2.0 NMPC
	more than 2.0 NMPC

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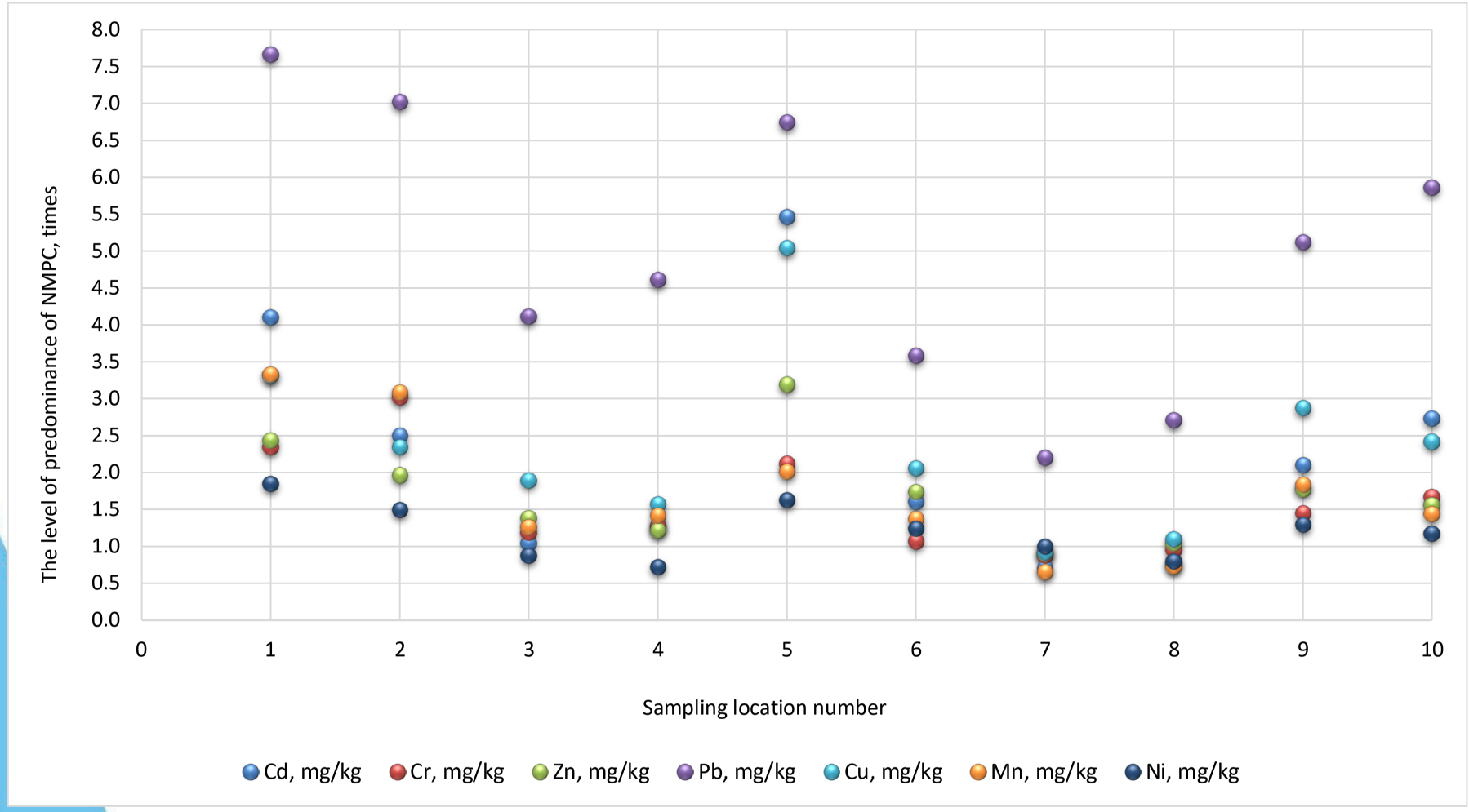
Annex 2

Predominance of heavy metals content by NMPC level in soil samples of different sampling locations, the area of the epicenter of impact



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Annex 3

The content of heavy metals in soils at a distance of 50 m from the epicenter of impact

Sample (0–50 m)	Name of tests and characteristics to be determined,														
	Cd, mg/kg	Cr, mg/kg	Zn, mg/kg	Hg, mg/kg	Se, mg/kg	Pb, mg/kg	As, mg/kg	F, mg/kg	B, mg/kg	Cu, mg/kg	Co, mg/kg	Mn, mg/kg	Ni, mg/kg	Sb, mg/kg	Mo, mg/kg
Location 1: Ukraine, Dnipropetrovsk region, Pavlograd district	8,3	178,6	527,6	0,42	0,15	192,4	0,7	232,4	3,5	207,8	17,6	3851	72,7	0,22	0,32
Location 2 : Ukraine, Dnipropetrovsk region, Synelnykivskyi district	5,4	198,3	406,5	0,35	0,19	174,3	0,64	182,6	3,9	175,3	21,4	3324	63,8	0,24	0,25
Location 3: Ukraine, Sumy region, Konotop district	2,6	102,4	326,4	<0,02	<0,1	115,8	0,38	145,6	4,2	119,3	13,3	1614	35,3	<0,1	0,32
Location 4: Ukraine, Sumy region, Okhtyrka district	2,2	98,7	298,5	<0,02	<0,1	134,2	<0,1	192,7	6,2	135,7	15,7	1877	34,1	<0,1	<0,1
Location 5: Ukraine, Kyiv region, Vasylkiv district	8,6	128,3	445,3	0,53	0,17	146,2	0,34	0,32*	5,6	287,4	10,4	2057	60,6	1,95	0,1
Location 6: Ukraine, Kyiv region, Bila Tserkva district	3,5	95,6	409,4	0,02	0,1	103,2	0,1	335,4	8,3	169,4	7,5	1654	56,9	0,1	0,1
Location 7: Ukraine, Chernihiv region, Mena district	1,8	78,4	239,8	<0,02	<0,1	59,4	0,18	117,6	2,6	68,3	9,3	857	33,8	<0,1	0,26
Location 8: Ukraine, Chernihiv region, Ichnya district	2	98,5	252,6	<0,02	<0,1	72,8	<0,1	308,7	3,6	87,6	14,2	953	27,6	<0,1	0,23
Location 9: Ukraine, Zhytomyr region, Zvyagel district	4,7	124,7	397,4	0,02	0,14	132,5	0,19	305,9	8,3	156,8	11,7	1870	52,8	0,14	0,18
Location 10: Ukraine, Zhytomyr region, Baranivka district	3,6	134,1	416,8	0,02	0,21	152,1	0,14	223,7	4,4	176,8	17,4	1852	55,4	0,31	0,5

* – indicator of the content of mobile fluorine, for other indicators – gross content

Color	The level of predominance of NMPC
	0.5 NMPC
	0.6–1.0 NMPC
	1.1–1.5 NMPC
	1.6–2.0 NMPC
	more than 2.0 NMPC

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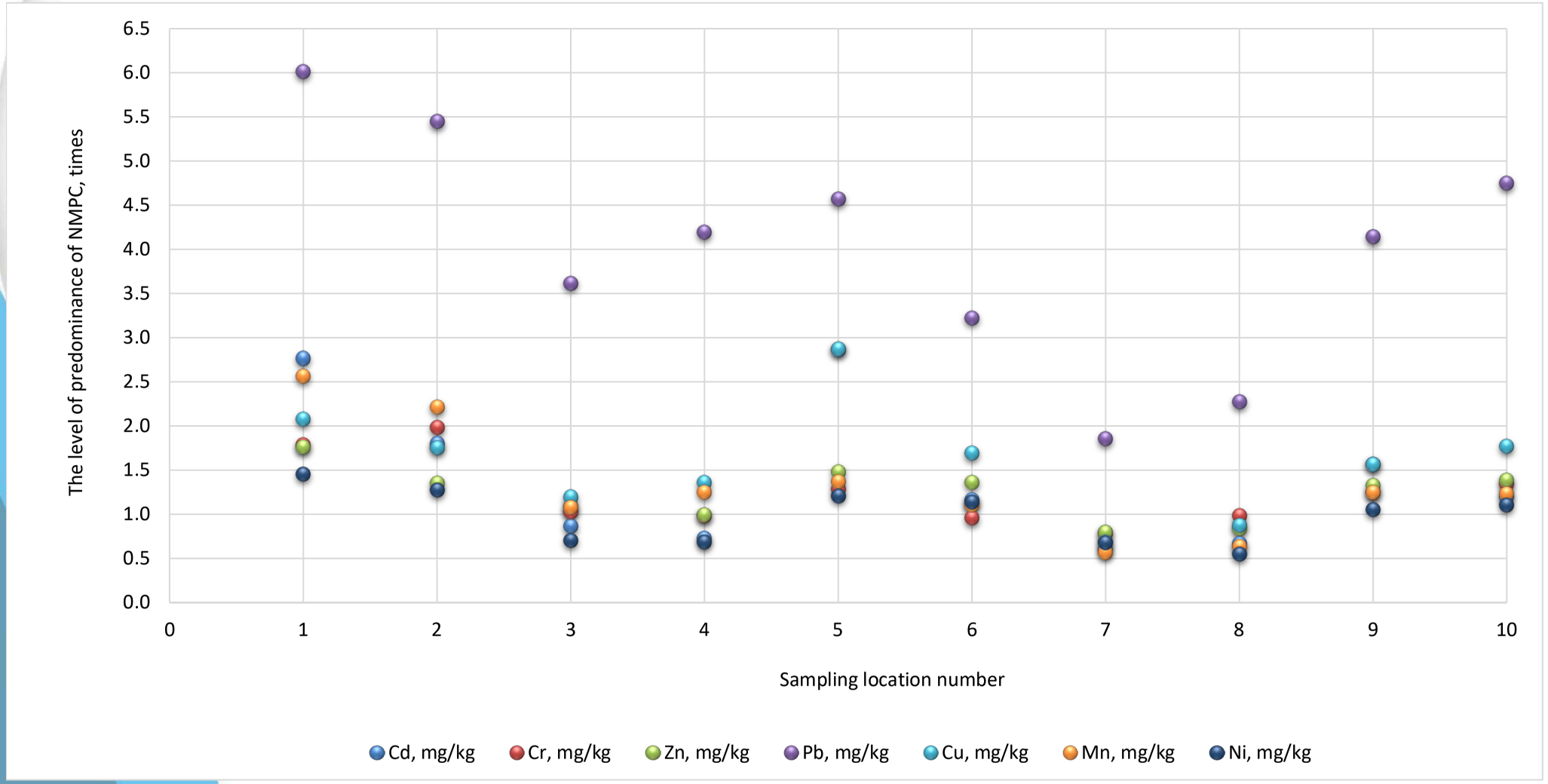
Annex 4

Predominance of heavy metals content in terms of NMPC level in soil samples of different sampling locations, 50 m from the epicenter of impact



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Annex 5

The content of heavy metals in soils at a distance of 100 m from the epicenter of impact

Sample (0–100 m)	Name of tests and characteristics to be determined,														
	Cd, mg/kg	Cr, mg/kg	Zn, mg/kg	Hg, mg/kg	Se, mg/kg	Pb, mg/kg	As, mg/kg	F, mg/kg	B, mg/kg	Cu, mg/kg	Co, mg/kg	Mn, mg/kg	Ni, mg/kg	Sb, mg/kg	Mo, mg/kg
Location 1: Ukraine, Dnipropetrovsk region, Pavlograd district	5,8	145,9	389,4	0,27	0,13	135,6	0,56	230,5	3,2	124,6	16,1	2706	50,6	0,22	0,31
Location 2 : Ukraine, Dnipropetrovsk region, Synelnykivskyi district	3,6	137,8	369,2	0,24	0,17	122,8	0,58	170,3	3,5	112,9	18,5	2124	47,4	0,22	0,23
Location 3: Ukraine, Sumy region, Konotop district	1,7	85,3	183,2	<0,02	<0,1	80,3	0,35	150,4	5,5	76,5	13,1	1187	22,4	<0,1	0,44
Location 4: Ukraine, Sumy region, Okhtyrka district	1,4	60,4	195,7	<0,02	<0,1	94,6	<0,1	187,4	6,5	85,5	14,2	1305	30,6	<0,1	<0,1
Location 5: Ukraine, Kyiv region, Vasylkiv district	6,3	115,9	408,6	0,42	0,14	131,7	0,23	0,25*	4,9	263,2	8,2	1834	55,1	1,86	0,1
Location 6: Ukraine, Kyiv region, Bila Tserkva district	2,3	82,4	274,5	0,02	0,1	87,9	0,1	150,4	8,5	126,5	10,8	1221	34,6	0,1	0,1
Location 7: Ukraine, Chernihiv region, Mena district	1,3	67,3	175,6	<0,02	<0,1	42,5	0,11	101,8	2,9	51,6	9	713	20,9	<0,1	0,31
Location 8: Ukraine, Chernihiv region, Ichnya district	1,4	66,9	187,4	<0,02	<0,1	63,4	<0,1	306,2	3,8	65,2	13,9	774	18,4	<0,1	0,25
Location 9: Ukraine, Zhytomyr region, Zvyagel district	1,9	89,5	301,5	0,02	0,23	126,3	0,13	220,5	4,2	125,3	17,5	1512	46,5	0,31	0
Location 10: Ukraine, Zhytomyr region, Baranivka district	2,1	76,8	251,2	0,019	0,14	119,7	0,15	319,7	8,5	132,1	12,2	1398	43,6	0,11	0,22

* – indicator of the content of mobile fluorine, for other indicators – gross content

Color	The level of predominance of NMPC
	0.5 NMPC
	0.6–1.0 NMPC
	1.1–1.5 NMPC
	1.6–2.0 NMPC

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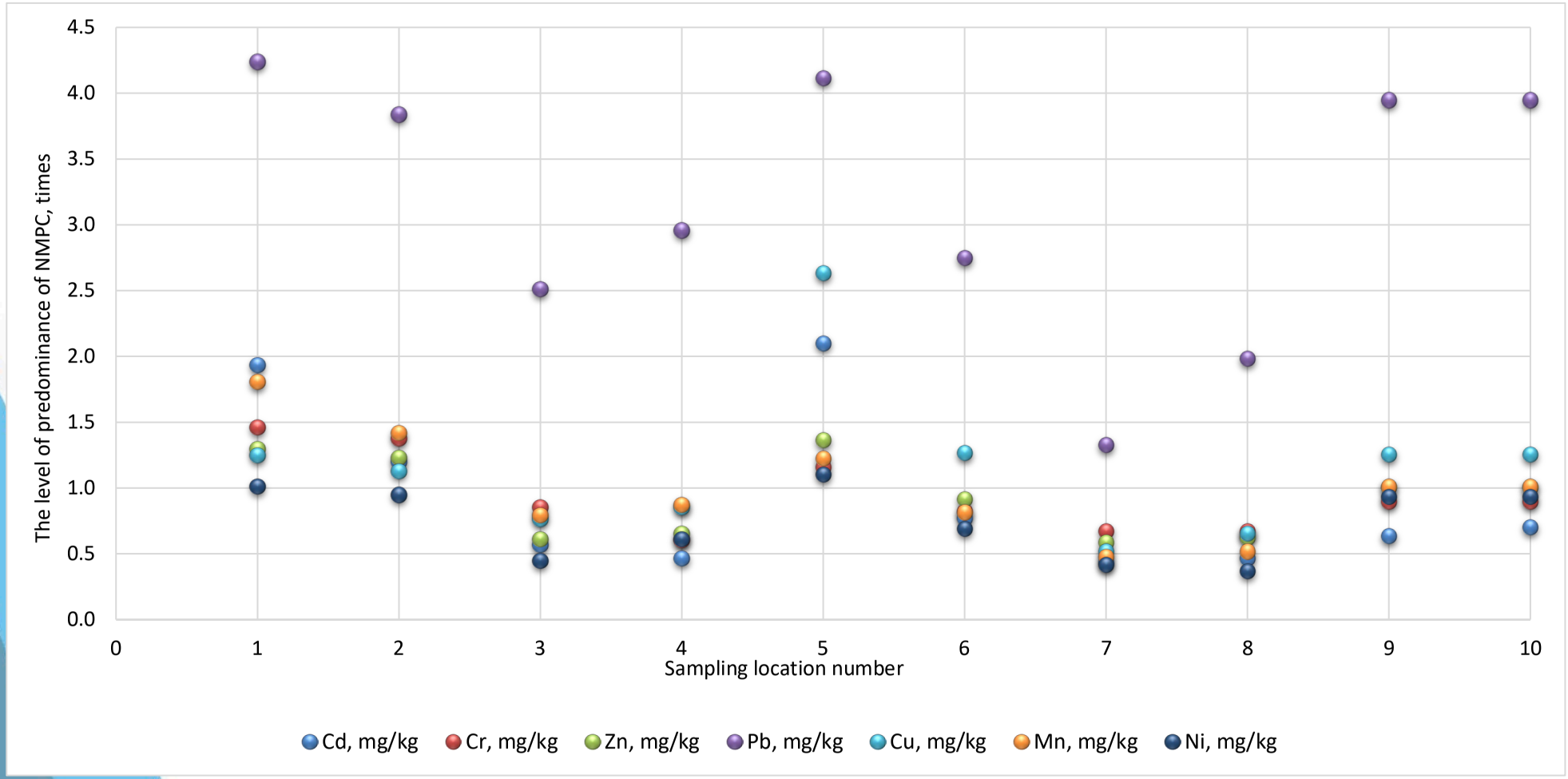
Annex 6

Predominance of heavy metals content in terms of NMPC level in soil samples of different sampling locations, 100 m from the epicenter of impact



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Annex 7

The content of heavy metals in soils at a distance of 200 m from the epicenter of impact

Sample (0–200 m)	Name of tests and characteristics to be determined,														
	Cd, mg/kg	Cr, mg/kg	Zn, mg/kg	Hg, mg/kg	Se, mg/kg	Pb, mg/kg	As, mg/kg	F, mg/kg	B, mg/kg	Cu, mg/kg	Co, mg/kg	Mn, mg/kg	Ni, mg/kg	Sb, mg/kg	Mo, mg/kg
Location 1: Ukraine, Dnipropetrovsk region, Pavlograd district	1,7	118,5	224,1	0,13	0,11	83,5	0,61	226,5	2,8	93,5	12,6	2135	36,4	0,2	0,31
Location 2 : Ukraine, Dnipropetrovsk region, Synelnykivskyi district	2,7	112,4	247,1	0,11	0,15	76,4	0,49	161,9	2,6	80,6	15,2	976	35,2	0,19	0,24
Location 3: Ukraine, Sumy region, Konotop district	0,8	56,7	109,5	<0,02	<0,1	46,5	0,35	142,6	5,5	55,6	12,6	875	17,2	<0,1	0,4
Location 4: Ukraine, Sumy region, Okhtyrka district	0,7	42,8	106,4	<0,02	<0,1	63,1	<0,1	183,3	6,5	42,8	13,5	983	27,5	<0,1	<0,1
Location 5: Ukraine, Kyiv region, Vasylkiv district	Not researched														
Location 6: Ukraine, Kyiv region, Bila Tserkva district	0,7	64,5	157,5	0,02	0,1	56,4	0,1	141,5	8,5	79,4	10,9	759	22,7	0,1	0,1
Location 7: Ukraine, Chernihiv region, Mena district	0,7	46,9	86,9	<0,02	<0,1	26,2	0,11	98,6	2,9	38,9	8,6	587	16,3	<0,1	0,31
Location 8: Ukraine, Chernihiv region, Ichnya district	0,8	51,3	92,5	<0,02	<0,1	46,8	<0,1	305,4	3,8	35,9	13,5	601	14,3	<0,1	0,26
Location 9: Ukraine, Zhytomyr region, Zvyagel district	1,1	63,9	138,4	0,018	0,23	91,5	0,13	218,4	4	106,8	17,7	1324	38,7	0,27	0
Location 10: Ukraine, Zhytomyr region, Baranivka district	0,5	52,4	84,5	0,016	0,13	40,2	0,15	324,3	8,7	71,3	11,9	1109	37,2	0,09	0,25

* – indicator of the content of mobile fluorine, for other indicators – gross content

Color	The level of predominance of NMPC
	0.5 NMPC
	0.6–1.0 NMPC
	1.1–1.5 NMPC
	1.6–2.0 NMPC
	more than 2.0 NMPC

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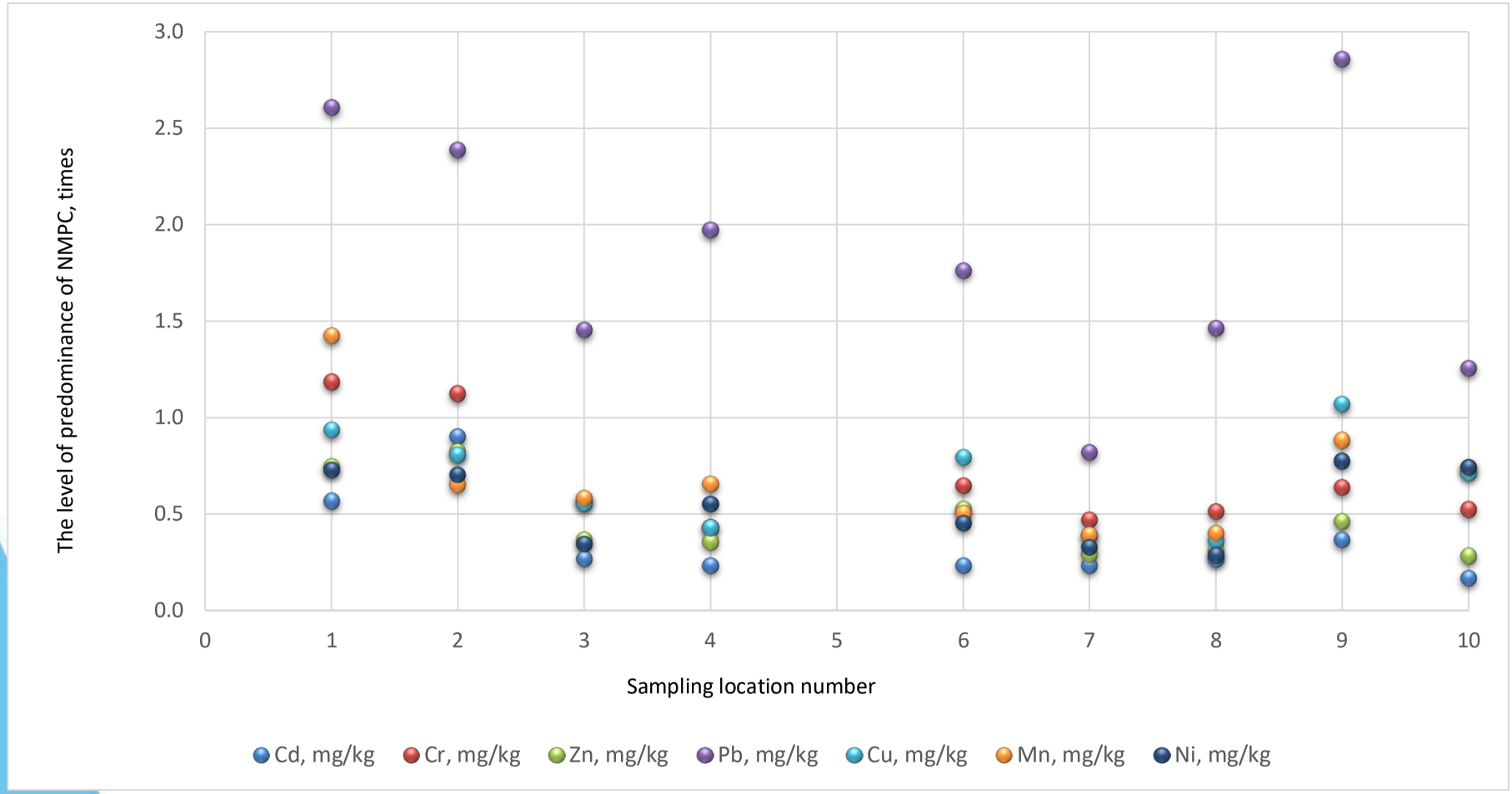
Annex 8

Predominance of heavy metals content in terms of NMPC level in soil samples of different sampling locations, 200 m from the epicenter of impact



Location 5 – no research was conducted

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Annex 9

The content of heavy metals in soils at a distance of 500 m from the epicenter of impact

Sample (0-500 m)	*Name of tests and characteristics to be determined,*														
	Cd, mg/kg	***Cr, mg/kg***	***Zn, mg/kg***	***Hg, mg/kg***	***Se, mg/kg***	***Pb, mg/kg***	***As, mg/kg***	***F, mg/kg***	***B, mg/kg***	***Cu, mg/kg***	***Co, mg/kg***	***Mn, mg/kg***	***Ni, mg/kg***	***Sb, mg/kg***	***Mo, mg/kg***
Location 1: Ukraine, Dnipropetrovsk region, Pavlograd district	1,2	98,6	128,7	0,12	0,11	54,6	0,55	221,5	2,4	84,9	11,5	1128	40,2	0,2	0,25
Location 2 : Ukraine, Dnipropetrovsk region, Synelnykivskyi district	1,1	107,3	134,5	0,07	0,12	48,2	0,51	154,7	2,1	71,5	14,8	853	30,9	0,18	0,22
Location 3: Ukraine, Sumy region, Konotop district	0,2	41,5	60,6	<0,02	<0,1	19,8	0,33	144,3	5,7	21,5	12,8	658	15,7	<0,1	0,41
Location 4: Ukraine, Sumy region, Okhtyrka district	0,3	37,9	49,7	<0,02	<0,1	22,6	<0,1	185,2	6,6	16,9	11,8	772	22,4	<0,1	<0,1
Location 5: Ukraine, Kyiv region, Vasylkiv district	No determined														
Location 6: Ukraine, Kyiv region, Bila Tserkva district	0,4	48,3	103,4	0,02	0,1	37,5	0,1	343,2	8,7	39,8	11,2	545	22,9	0,1	0,1
Location 7: Ukraine, Chernihiv region, Mena district	0,2	25,4	49,7	<0,02	<0,1	16,7	0,1	95,6	3,1	11,4	8,8	423	14,6	<0,1	0,32
Location 8: Ukraine, Chernihiv region, Ichnya district	0,3	28,4	51,3	<0,02	<0,1	21,6	<0,1	301,3	3,9	14,3	9,6	521	10,5	<0,1	0,25
Location 9: Ukraine, Zhytomyr region, Zvyagel district	0,5	52,4	84,5	0,02	0,13	40,2	0,15	324,3	8,7	71,3	11,9	1109	37,2	0,09	0,25
Location 10: Ukraine, Zhytomyr region, Baranivka district	0,87	45,7	95,2	0,02	0,25	46,2	0,11	212,8	3,7	52,9	17,9	956	34,1	0,21	0,54

Color	The level of predominance of NMPC
	0.5 NMPC
	0.6–1.0 NMPC
	1.1–1.5 NMPC
	1.6–2.0 NMPC

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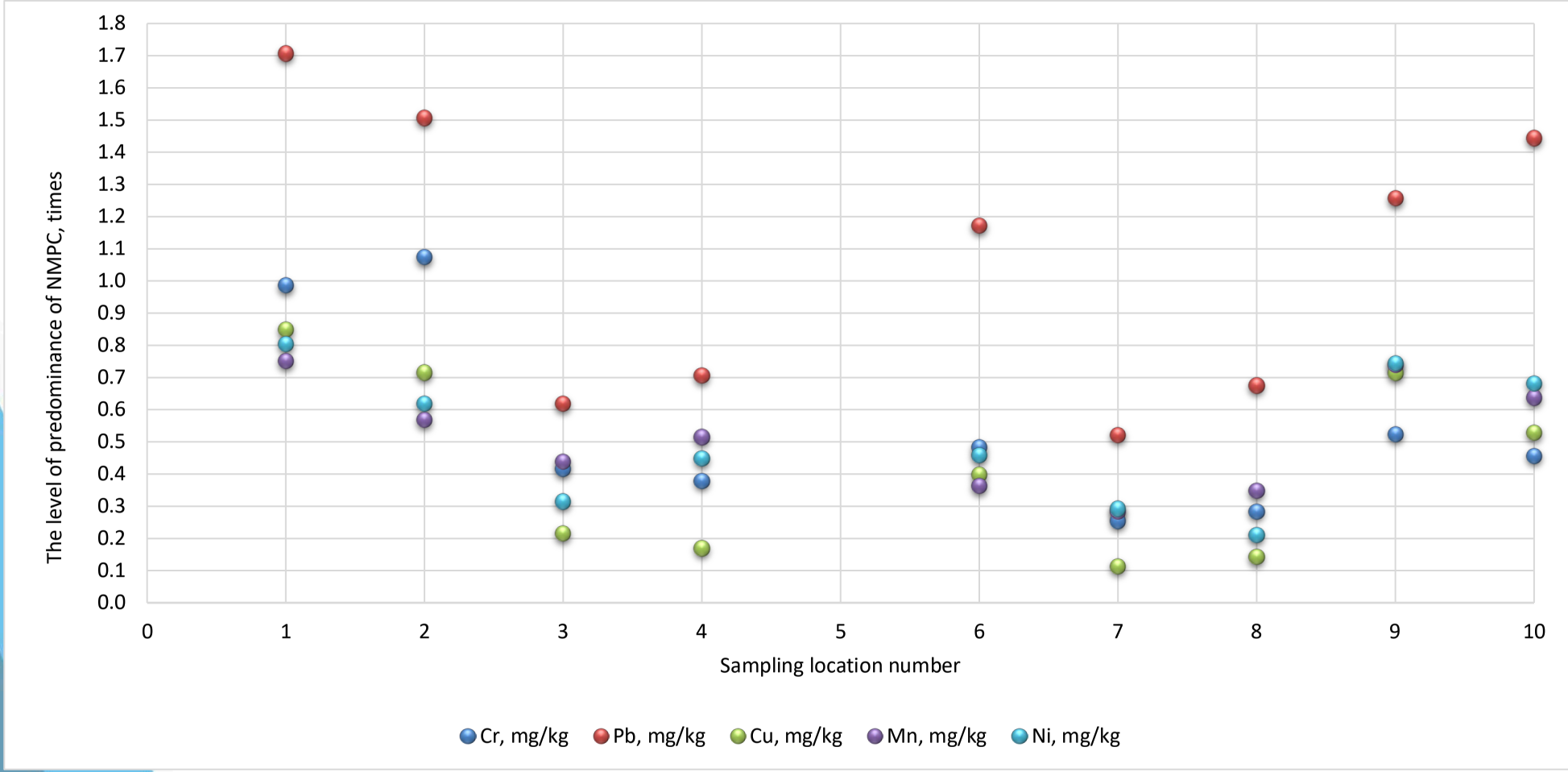
Annex 10

Predominance of heavy metals content in terms of NMPC level in soil samples of different sampling locations, 500 m from the epicenter of impact



Location 5 – no research was conducted

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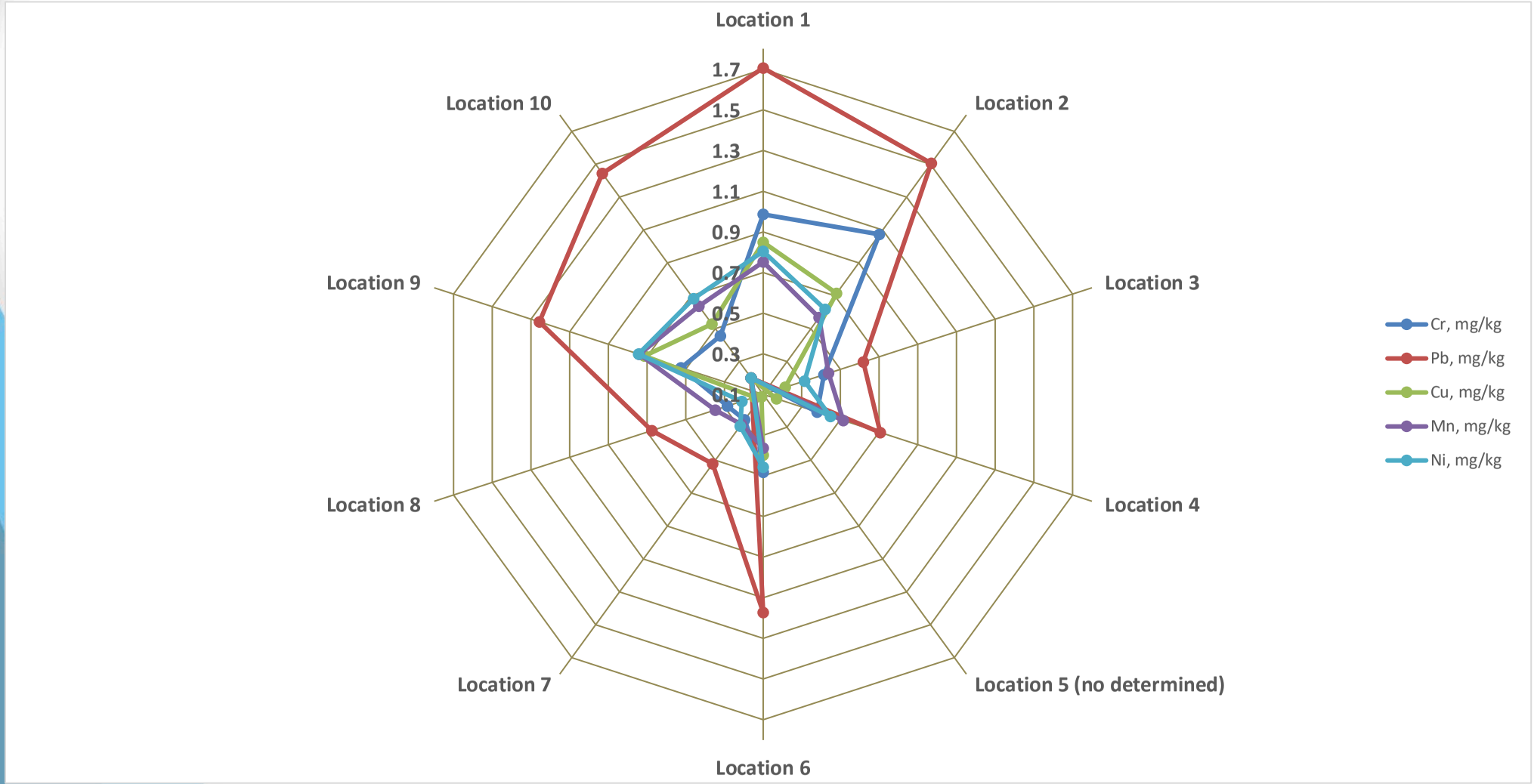
Annex 11

Predominance of the content of heavy metals at the NMPC level in soil samples from different sampling sites, the distance from the epicenter is 500 m



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Location information using GPS

Location	*A distance of 500 meters*	*A distance of 200 meters*	*A distance of 100 meters*	*A distance of 50 meters*	*At near the impact point of the bomb/explosion point*
Location 1: Ukraine, Dnipropetrovsk region, Pavlograd district	48.8064, 36.01813	48.80386, 36.01912	48.80302, 36.01968	48.80261, 36.01985	48.802170, 36.020041
Location 2 : Ukraine, Dnipropetrovsk region, Synelnykivskyi district	48.15548, 35.26077	48.1528, 35.26027	48.1519, 35.26012	48.15143, 35.26004	48.151, 35.25999
Location 3: Ukraine, Sumy region, Konotop district	51.17413, 33.45982	51.17408, 33.45556	51.17402, 33.45414	51.17397, 33.45341	51.173961, 33.452665
Location 4: Ukraine, Sumy region, Okhtyrka district	50.21383, 34.92348	50.21295, 34.91946	50.2128, 34.91809	50.21278, 34.91734	50.212665, 34.916726
Location 5: Ukraine, Kyiv region, Vasylkiv district	Not researched	Not researched	50.05318, 30.2911	50.0528, 30.29146	50.0524137, 30.2918239
Location 6: Ukraine, Kyiv region, Bila Tserkva district	49.84034, 30.08588	49.84283, 30.08494	49.84375, 30.08458	49.84421, 30.08439	49.84465, 30.08425
Location 7: Ukraine, Chernihiv region, Mena district	51.614842, 31.70313	51.61803, 31.69858	51.61827, 31.69719	51.61831, 31.69659	51.61834, 31.69579
Location 8: Ukraine, Chernihiv region, Ichnya district	50.76585, 32.67614	50.76613, 32.67187	50.76637, 32.67052	50.76648, 32.66975	50.76652, 32.66909
Location 9: Ukraine, Zhytomyr region, Zvyagel district	50.44037, 27.456526	50.4395, 27.4622	50.44031, 27.46282	50.44071, 27.46312	50.44112, 27.46343
Location 10: Ukraine, Zhytomyr region, Baranivka district	50.41868, 27.29883	50.41622, 27.29732	50.41536, 27.29688	50.41495, 27.29663	50.41453, 27.29638

Location	*A distance of 30 meters*	*A distance of 10 meters*
Location 5: Ukraine, Kyiv region, Vasylkiv district	50.05264, 30.29161	50.05249, 30.29174

Laboratory Data

Location - 1

PLT
Prime Lab Tech

Laboratory location:
115-V, Kyivskyi Shliakh str.,
village Velyka Oleksandrivka,
Boryspil district Kyiv region
Ukraine

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Certificate of Analysis №2423-1
January 25, 2024

Customer: "Berrymore Activ" LLC
Location: Ukraine, Dnipropetrovsk region, Pavlograd district
Location information using GPS: 48.8064, 36.01813
E-mail: vital.berry@gmail.com
Sample: Soil at a distance of 500 meters

Date of selection: 15.01.2024
Sample condition: appropriate
Delivery date: 16.01.2024
Analysis period: 16.01.2024 - 25.01.2024

Test results

Sample	Indicator name, unit of measurement												
	N (NH_4) mg/kg	N (NO_3) mg/kg	Ph hydrolitic mmol/100g	Ph exchangeable	Mass fraction of carbon, %	S, mg/kg	P_2O_5 mg/kg	K_2O mg/kg	Ca, mg/kg	Mg, mg/kg	Na, mg/kg	Sum of absorbed bases, mmol/100 g	Electrical conductivity, mSm/m
Soil	5,6	2,8	0,70	7,1	1,7	3,7	13,9	344,6	3850,0	387,3	46,5	22,5	147,1

Test results

Name of tests and characteristics to be determined	*Soil at near the impact point of the bomb/explosion point*	*Soil at a distance of 50 meters*	*Soil at a distance of 100 meters*	*Soil at a distance of 200 meters*	*Soil at a distance of 500 meters*	*Uncertainty of measurement*
Clay 0,002 mm, %	25,6	25,5	25,5	25,3	25,3	+/- 1,1
Silt 0,05-0,002 mm, %	26,9	26,8	26,5	25,9	25,3	+/- 1,0
Sand 2-0,05 mm, %	47,5	47,7	48,0	48,8	49,4	+/- 1,4
Humus content, %	2,21	2,47	2,76	3,08	3,15	-

Expanded uncertainty of measurement is the actual value expressed in units of the measurement value, obtained by multiplying the standard uncertainties by the coverage factor k=2, which provides a normal distribution of uncertainty and approximately corresponds to 95% probability of coverage, calculated according to the requirements of the Service Customer.

Methods of determination:

DSTU 4405:2005, DSTU 4115-2002, DSTU 4114-2002 Soil quality. Determination of mobile compounds of phosphorus and potassium.

WREP-125, 3rd Edition, 2005 – Soil, plant and water reference methods for the Western Region S-14.10 – Partical size anlysis. Hydrometer Method..

Notes:

1. *The results of the determinations are presented in terms of the air-dry state of the soil.*
2. *The test results apply only to those samples that have been submitted for testing and indicated in the input data of the test report.*
3. *Withoutthe original signature, the test report is considered invalid.*
4. *Reproduction of the test report is partially or completely impossible without the written permission of the laboratory.*

Approved:
General director of the Laboratory of Prime Lab Tech LLC: _____ **L.V. Vasylenko**
Signature

End of protocol

PLT
Prime Lab Tech

Laboratory location:
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village Velyka Oleksandrivka,
Boryspil district Kyiv region
Ukraine

Contacts:
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Test results

Sample	*Name of tests and characteristics to be determined,*														
	Cd, mg/kg	***Cr, mg/kg***	***Zn, mg/kg***	***Hg, mg/kg***	***Se, mg/kg***	***Pb, mg/kg***	***As, mg/kg***	***F, mg/kg***	***B, mg/kg***	***Cu, mg/kg***	***Co, mg/kg***	***Mn, mg/kg***	***Ni, mg/kg***	***Sb, mg/kg***	***Mo, mg/kg***
Soil at near the impact point of the bomb/explosion point	12,3	234,2	729,6	0,48	0,17	245,1	0,71	237,6	3,5	331,6	18,2	4987	92,1	0,26	0,34
Soil at a distance of 50 meters	8,3	178,6	527,6	0,42	0,15	192,4	0,70	232,4	3,5	207,8	17,6	3851	72,7	0,22	0,32
Soil at a distance of 100 meters	5,8	145,9	389,4	0,27	0,13	135,6	0,56	230,5	3,2	124,6	16,1	2706	50,6	0,22	0,31
Soil at a distance of 200 meters	1,7	118,5	224,1	0,13	0,11	83,5	0,61	226,5	2,8	93,5	12,6	2135	36,4	0,20	0,31
Soil at a distance of 500 meters	1,2	98,6	128,7	0,12	0,11	54,6	0,55	221,5	2,4	84,9	11,5	1128	40,2	0,20	0,25
NMPC	***3***	***100***	***300***	***2,1***	***0,6***	***32***	***2***	*–*	***30***	***100***	***50***	***1500***	***50***	***4,5***	*–*
Region clarke	***0,16*****	***85****	***62****	***0,02*****	***0,3*****	***13****	***5,2*****	***250*****	***5,0*****	***27****	***16****	***670****	***25****	***0,23*****	***0,36*****

NMPC - norms of the maximum permissible concentration, milligrams per kilogram based on a research background (clarke) (approved by the resolution of the Cabinet of Ministers of Ukraine dated December 15, 2021 No. 1325).

** - Regional clarke of heavy metals for the substantiation of Ukraine, mg/kg (according to A.I. Fateev).*

*** - Regional geochemical studies of the soils of Ukraine within the framework of the international project (GEMAS) (author V.R. Klos).*

Laboratory Data
Location - 2

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Certificate of Analysis №1091-1
January 25, 2024

Customer: TANDEM-AGRO FARM
Location: Ukraine, Dnipropetrovsk region, Synelnykivskyi district
Location information using GPS: 48.15548, 35.26077
E-mail: Tandenagro@ukr.net
Sample: Soil at a distance of 500 meters

Date of selection: 14.01.2024
Sample condition: appropriate
Delivery date: 16.01.2024
Analysis period: 16.01.2024 - 25.01.2024

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Test results

Sample	Indicator name, unit of measurement												
	N (NH_4) mg/kg	N (NO_3) mg/kg	Ph hydrolitic mmol/100g	Ph exchangeable	Mass fraction of carbon, %	S, mg/kg	P_2O_5 mg/kg	K_2O mg/kg	Ca, mg/kg	Mg, mg/kg	Na, mg/kg	Sum of absorbed bases, mmol/100 g	Electrical conductivity, mSm/m
Soil	14,5	3,8	0,60	7,0	3,2	1,7	133,0	282,0	5231,0	394,9	82,0	47,8	150,8

Annex 3.4.1

Prime Lab Tech

Laboratory location:
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№201741
ДСТУ EN ISO/IEC 17025

Test results

Name of tests and characteristics to be determined	*Soil at near the impact point of the bomb/explosion point*	*Soil at a distance of 50 meters*	*Soil at a distance of 100 meters*	*Soil at a distance of 200 meters*	*Soil at a distance of 500 meters*	*Uncertainty of measurement*
Clay 0,002 mm, %	27,8	28,0	28,1	28,3	28,6	+/- 1,1
Silt 0,05-0,002 mm, %	25,6	25,4	24,7	24,4	24,6	+/- 1,0
Sand 2-0,05 mm, %	46,6	46,6	47,2	47,3	46,8	+/- 1,4
Humus content, %	2,64	3,02	3,16	3,24	3,26	-

Expanded uncertainty of measurement is the actual value expressed in units of the measurement value, obtained by multiplying the standard uncertainties by the coverage factor k=2, which provides a normal distribution of uncertainty and approximately corresponds to 95% probability of coverage, calculated according to the requirements of the Service Customer.

Methods of determination:

DSTU 4405:2005, DSTU 4115-2002, DSTU 4114-2002 Soil quality. Determination of mobile compounds of phosphorus and potassium.
WREP-125, 3rd Edition, 2005 – Soil, plant and water reference methods for the Western Region S-14.10 – Partical size anlysis. Hydrometer Method.

Notes:

1. *The results of the determinations are presented in terms of the air-dry state of the soil.*
2. *The test results apply only to those samples that have been submitted for testing and indicated in the input data of the test report.*
3. *Withoutthe original signature, the test report is considered invalid.*
4. *Reproduction of the test report is partially or completely impossible without the written permission of the laboratory.*

Approved:
General director of the Laboratory of Prime Lab Tech LLC: _____ **L.V. Vasylenko**
Signature

End of protocol

Prime Lab Tech

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National Accreditation Agency of Ukraine
№201741
ДСТУ EN ISO/IEC 17025

Test results

Sample	*Name of tests and characteristics to be determined,*														
	Cd, mg/kg	***Cr, mg/kg***	***Zn, mg/kg***	***Hg, mg/kg***	***Se, mg/kg***	***Pb, mg/kg***	***As, mg/kg***	***F, mg/kg***	***B, mg/kg***	***Cu, mg/kg***	***Co, mg/kg***	***Mn, mg/kg***	***Ni, mg/kg***	***Sb, mg/kg***	***Mo, mg/kg***
Soil at near the impact point of the bomb/explosion point	7,5	302,3	587,9	0,51	0,21	224,7	0,83	206,3	4,2	234,8	25,7	4627	74,6	0,21	0,27
Soil at a distance of 50 meters	5,4	198,3	406,5	0,35	0,19	174,3	0,64	182,6	3,9	175,3	21,4	3324	63,8	0,24	0,25
Soil at a distance of 100 meters	3,6	137,8	369,2	0,24	0,17	122,8	0,58	170,3	3,5	112,9	18,5	2124	47,4	0,22	0,23
Soil at a distance of 200 meters	2,7	112,4	247,1	0,11	0,15	76,4	0,49	161,9	2,6	80,6	15,2	976	35,2	0,19	0,24
Soil at a distance of 500 meters	1,1	107,3	134,5	0,07	0,12	48,2	0,51	154,7	2,1	71,5	14,8	853	30,9	0,18	0,22
NMPC	***3***	***100***	***300***	***2,1***	***0,6***	***32***	***2***	–	***30***	***100***	***50***	***1500***	***50***	***4,5***	–
Region clarke	***0,16*****	***85****	***62****	***0,02*****	***0,3*****	***13****	***5,2*****	***250*****	***5,0*****	***27****	***16****	***670****	***25****	***0,23*****	***0,36*****

NMPC - norms of the maximum permissible concentration, milligrams per kilogram based on a research background (clarke) (approved by the resolution of the Cabinet of Ministers of Ukraine dated December 15, 2021 No. 1325).

** - Regional clarke of heavy metals for the substantiation of Ukraine, mg/kg (according to A.I. Fateev).*

*** - Regional geochemical studies of the soils of Ukraine within the framework of the international project (GEMAS) (author V.R. Klos).*

Laboratory Data
Location - 3

Prime Lab Tech

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№201741
ДСТУ EN ISO/IEC 17025

Certificate of Analysis №2710-1
February 7, 2024

Customer: «Agro Team» LLC
Location: Ukraine, Sumy region, Konotop district
Location information using GPS: 51.17413, 33.45982
E-mail: GSSumarokova@gmail.com
Sample: Soil at a distance of 500 meters

Date of selection: 27.01.2024
Sample condition: appropriate
Delivery date: 28.01.2024
Analysis period: 28.01.2024 - 07.02.2024

Test results

Sample	Indicator name, unit of measurement												
	N (NH_4) mg/kg	N (NO_3) mg/kg	Ph hydrolitic mmol/100g	Ph exchangeable	Mass fraction of carbon, %	S, mg/kg	P_2O_5 mg/kg	K_2O mg/kg	Ca, mg/kg	Mg, mg/kg	Na, mg/kg	Sum of absorbed bases, mmol/100 g	Electrical conductivity, mSm/m
Soil	10,4	5,6	0,33	7,3	2,3	5,2	35,3	75,3	2950,0	455,6	68,9	18,6	15,50

27/57

Annex 3.4.1

Test results

Name of tests and characteristics to be determined	*Soil at near the impact point of the bomb/explosion point*	*Soil at a distance of 50 meters*	*Soil at a distance of 100 meters*	*Soil at a distance of 200 meters*	*Soil at a distance of 500 meters*	*Uncertainty of measurement*
Clay 0,002 mm, %	9,6	10,1	11,2	12,1	12,7	+/- 1,0
Silt 0,05-0,002 mm, %	25,7	25,8	25,9	25,8	25,4	+/- 0,7
Sand 2-0,05 mm, %	64,7	64,1	62,9	62,1	61,93,	+/- 1,1
Humus content, %	3,4	3,5	3,8	4,0	4,3	-

Expanded uncertainty of measurement is the actual value expressed in units of the measurement value, obtained by multiplying the standard uncertainties by the coverage factor k=2, which provides a normal distribution of uncertainty and approximately corresponds to 95% probability of coverage, calculated according to the requirements of the Service Customer.

Methods of determination:

DSTU 4405:2005, DSTU 4115-2002, DSTU 4114-2002 Soil quality. Determination of mobile compounds of phosphorus and potassium.
WREP-125, 3rd Edition, 2005 – Soil, plant and water reference methods for the Western Region S-14.10 – Partical size anlysis. Hydrometer Method..

Notes:

1. *The results of the determinations are presented in terms of the air-dry state of the soil.*
2. *The test results apply only to those samples that have been submitted for testing and indicated in the input data of the test report.*
3. *Withoutthe original signature, the test report is considered invalid.*
4. *Reproduction of the test report is partially or completely impossible without the written permission of the laboratory.*

Approved:
General director of the Laboratory of Prime Lab Tech LLC: _____ **L.V. Vasylenko**
Signature

End of protocol

PLT
Prime Lab Tech

Laboratory location:
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village Velyka Oleksandrivka,
Boryspil district Kyiv region
Ukraine

Contacts:
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office@plt.land
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Test results

Sample	*Name of tests and characteristics to be determined,*														
	Cd, mg/kg	***Cr, mg/kg***	***Zn, mg/kg***	***Hg, mg/kg***	***Se, mg/kg***	***Pb, mg/kg***	***As, mg/kg***	***F, mg/kg***	***B, mg/kg***	***Cu, mg/kg***	***Co, mg/kg***	***Mn, mg/kg***	***Ni, mg/kg***	***Sb, mg/kg***	***Mo, mg/kg***
Soil at near the impact point of the bomb/explosion point	3,1	118,3	414,6	<0,02	<0,1	131,5	0,41	165,4	3,9	189,4	13,5	1890	43,8	<0,1	0,30
Soil at a distance of 50 meters	2,6	102,4	326,4	<0,02	<0,1	115,8	0,38	145,6	4,2	119,3	13,3	1614	35,3	<0,1	0,32
Soil at a distance of 100 meters	1,7	85,3	183,2	<0,02	<0,1	80,3	0,35	150,4	5,5	76,5	13,1	1187	22,4	<0,1	0,44
Soil at a distance of 200 meters	0,8	56,7	109,5	<0,02	<0,1	46,5	0,35	142,6	5,5	55,6	12,6	875	17,2	<0,1	0,40
Soil at a distance of 500 meters	0,2	41,5	60,6	<0,02	<0,1	19,8	0,33	144,3	5,7	21,5	12,8	658	15,7	<0,1	0,41
NMPC	***3***	***100***	***300***	***2,1***	***0,6***	***32***	***2***	–	***30***	***100***	***50***	***1500***	***50***	***4,5***	_
Region clarke	***0,16*****	***85****	***62****	***0,02*****	***0,3*****	***13****	***5,2*****	***250*****	***5,0*****	***27****	***16****	***670****	***25****	***0,23*****	***0,36*****

NMPC - norms of the maximum permissible concentration, milligrams per kilogram based on a research background (clarke) (approved by the resolution of the Cabinet of Ministers of Ukraine dated December 15, 2021 No. 1325).

** - Regional clarke of heavy metals for the substantiation of Ukraine, mg/kg (according to A.I. Fateev).*

*** - Regional geochemical studies of the soils of Ukraine within the framework of the international project (GEMAS) (author V.R. Klos).*

Laboratory Data
Location - 4

PLT
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Laboratory location:
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Certificate of Analysis №2715-1
February 7, 2024

Customer: «Zodiac-VM» LLC
Location: Ukraine, Sumy region, Okhtyrka district
Location information using GPS: 50.21383, 34.92348
E-mail: ellibet01@gmail.com
Sample: Soil at a distance of 500 meters

Date of selection: 26.01.2024
Sample condition: appropriate
Delivery date: 28.01.2024
Analysis period: 28.01.2024 - 07.02.2024

Test results

Sample	Indicator name, unit of measurement												
	N (NH_4) mg/kg	N (NO_3) mg/kg	Ph hydrolitic mmol/100g	Ph exchangeable	Mass fraction of carbon, %	S, mg/kg	P_2O_5 mg/kg	K_2O mg/kg	Ca, mg/kg	Mg, mg/kg	Na, mg/kg	Sum of absorbed bases, mmol/100 g	Electrical conductivity, mSm/m
Soil	5,3	10,2	1,6	5,2	0,8	8,8	58,0	69,3	650,0	151,9	35,2	4,6	5,77

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Prime Lab Tech

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National Accreditation Agency of Ukraine
№201741
ДСТУ EN ISO/IEC 17025

Test results

Name of tests and characteristics to be determined	*Soil at near the impact point of the bomb/explosion point*	*Soil at a distance of 50 meters*	*Soil at a distance of 100 meters*	*Soil at a distance of 200 meters*	*Soil at a distance of 500 meters*	*Uncertainty of measurement*
Clay 0,002 mm, %	17,7	17,8	18,0	18,1	18,3	+/- 0,8
Silt 0,05-0,002 mm, %	26,8	27,1	27,6	27,1	27,2	+/- 1,0
Sand 2-0,05 mm, %	55,5	55,1	54,4	54,8	54,2	+/- 1,1
Humus content, %	1,1	1,2	1,4	1,4	1,5	-

Expanded uncertainty of measurement is the actual value expressed in units of the measurement value, obtained by multiplying the standard uncertainties by the coverage factor k=2, which provides a normal distribution of uncertainty and approximately corresponds to 95% probability of coverage, calculated according to the requirements of the Service Customer.

Methods of determination:

DSTU 4405:2005, DSTU 4115-2002, DSTU 4114-2002 Soil quality. Determination of mobile compounds of phosphorus and potassium.
WREP-125, 3rd Edition, 2005 – Soil, plant and water reference methods for the Western Region S-14.10 – Partical size anlysis. Hydrometer Method..

Notes:

1. *The results of the determinations are presented in terms of the air-dry state of the soil.*
2. *The test results apply only to those samples that have been submitted for testing and indicated in the input data of the test report.*
3. *Withoutthe original signature, the test report is considered invalid.*
4. *Reproduction of the test report is partially or completely impossible without the written permission of the laboratory.*

Approved:
General director of the Laboratory of Prime Lab Tech LLC: _____ **L.V. Vasylenko**
Signature

End of protocol

PLT
Prime Lab Tech

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Test results

Sample	*Name of tests and characteristics to be determined,*														
	Cd, mg/kg	***Cr, mg/kg***	***Zn, mg/kg***	***Hg, mg/kg***	***Se, mg/kg***	***Pb, mg/kg***	***As, mg/kg***	***F, mg/kg***	***B, mg/kg***	***Cu, mg/kg***	***Co, mg/kg***	***Mn, mg/kg***	***Ni, mg/kg***	***Sb, mg/kg***	***Mo, mg/kg***
Soil at near the impact point of the bomb/explosion point	3,8	127,5	365,3	<0,02	<0,1	147,6	<0,1	195,6	6	156,4	16,4	2125	35,9	<0,1	<0,1
Soil at a distance of 50 meters	2,2	98,7	298,5	<0,02	<0,1	134,2	<0,1	192,7	6,2	135,7	15,7	1877	34,1	<0,1	<0,1
Soil at a distance of 100 meters	1,4	60,4	195,7	<0,02	<0,1	94,6	<0,1	187,4	6,5	85,5	14,2	1305	30,6	<0,1	<0,1
Soil at a distance of 200 meters	0,7	42,8	106,4	<0,02	<0,1	63,1	<0,1	183,3	6,5	42,8	13,5	983	27,5	<0,1	<0,1
Soil at a distance of 500 meters	0,3	37,9	49,7	<0,02	<0,1	22,6	<0,1	185,2	6,6	16,9	11,8	772	22,4	<0,1	<0,1
NMPC	***3***	***100***	***300***	***2,1***	***0,6***	***32***	***2***	–	***30***	***100***	***50***	***1500***	***50***	***4,5***	–
Region clarke	***0,16*****	***85****	***62****	***0,02*****	***0,3*****	***13****	***5,2*****	***250*****	***5,0*****	***27****	***16****	***670****	***25****	***0,23*****	***0,36*****

NMPC - norms of the maximum permissible concentration, milligrams per kilogram based on a research background (clarke) (approved by the resolution of the Cabinet of Ministers of Ukraine dated December 15, 2021 No. 1325).

** - Regional clarke of heavy metals for the substantiation of Ukraine, mg/kg (according to A.I. Fateev).*

*** - Regional geochemical studies of the soils of Ukraine within the framework of the international project (GEMAS) (author V.R. Klos).*

Laboratory Data
Location - 5

Prime Lab Tech

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National Accreditation Agency of Ukraine
№201741
ДСТУ EN ISO/IEC 17025

Certificate of Analysis №2512-1
December 25, 2023

Customer: SOLOMIA-A FARM
Location: Ukraine, Kyiv region, Vasylkiv district
Location information using GPS: 50.05318, 30.2911
E-mail: Solomia@gmail.com
Sample: Soil at a distance of 100 meters

Date of selection: 01.12.2023
Sample condition: appropriate
Delivery date: 02.12.2023
Analysis period: 04.12.2023-25.12.2023

Test results

Sample	Indicator name, unit of measurement												
	N (NH_4) mg/kg	N (NO_3) mg/kg	Ph hydrolitic mmol/100g	Ph exchangeable	Mass fraction of carbon, %	S, mg/kg	P_2O_5 mg/kg	K_2O mg/kg	Ca, mg/kg	Mg, mg/kg	Na, mg/kg	Sum of absorbed bases, mmol/100 g	Electrical conductivity, mSm/m
Soil	3,7	6,6	1,13	6,3	2,97	7,0	19,6	102,1	837,5	197,4	67,5	14,3	11,95

Prime Lab Tech

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National Accreditation Agency of Ukraine
№201741
ДСТУ EN ISO/IEC 17025

Test results

Name of tests and characteristics to be determined	*Soil at a distance of 100 meters*	*Soil at a distance of 50 meters*	*Soil at a distance of 30 meters*	*Soil at a distance of 10 meters*	*Soil at near the impact point of the bomb/explosion point*	*Uncertainty of measurement*
Clay 0,002 mm, %	0,0	0,0	0,0	0,0	0,0	+/- 0,7
Silt 0,05-0,002 mm, %	18,5	18,5	19,6	19,5	21,3	+/- 1,4
Sand 2-0,05 mm, %	81,5	81,5	80,4	80,5	78,7	+/- 1,2

Expanded uncertainty of measurement is the actual value expressed in units of the measurement value, obtained by multiplying the standard uncertainties by the coverage factor k=2, which provides a normal distribution of uncertainty and approximately corresponds to 95% probability of coverage, calculated according to the requirements of the Service Customer.

Methods of determination:
DSTU 4405:2005, DSTU 4115-2002, DSTU 4114-2002 Soil quality. Determination of mobile compounds of phosphorus and potassium.
WREP-125, 3rd Edition, 2005 – Soil, plant and water reference methods for the Western Region S-14.10 – Partical size anlysis. Hydrometer Method.

Notes:

1. *The results of the determinations are presented in terms of the air-dry state of the soil.*
2. *The test results apply only to those samples that have been submitted for testing and indicated in the input data of the test report.*
3. *Withoutthe original signature, the test report is considered invalid.*
4. *Reproduction of the test report is partially or completely impossible without the written permission of the laboratory.*

Approved:
General director of the Laboratory of Prime Lab Tech LLC: _____ **L.V. Vasylenko**
Signature

End of protocol

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Prime Lab Tech

Laboratory location:
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village Velyka Oleksandrivka,
Boryspil district Kyiv region
Ukraine

Contacts:
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Test results

Sample	*Name of tests and characteristics to be determined,*													
	Cd, mg/kg	***Cr, mg/kg***	***Zn, mg/kg***	***Hg, mg/kg***	***Se, mg/kg***	***Pb, mg/kg***	***As, mg/kg***	***F, mg/kg***	***B, mg/kg***	***Cu, mg/kg***	***Co, mg/kg***	***Mn, mg/kg***	***Ni, mg/kg***	***Sb, mg/kg***
Soil at near the impact point of the bomb/explosion point	16,4	211,8	956,8	0,97	0,24	215,9	0,78	0,72	8,7	504,3	19,2	3012	81,2	2,24
Soil at a distance of 10 meters	12,2	187,3	761,3	0,81	0,21	188,6	0,52	0,67	8,1	426,5	16,7	2872	70,6	2,15
Soil at a distance of 30 meters	10,8	154,9	543,2	0,67	0,19	163,5	0,45	0,54	7,4	311,3	13,4	2432	65,4	2,07
Soil at a distance of 50 meters	8,6	128,3	445,3	0,53	0,17	146,2	0,34	0,32	5,6	287,4	10,4	2057	60,6	1,95
Soil at a distance of 100 meters	6,3	115,9	408,6	0,42	0,14	131,7	0,23	0,25	4,9	263,2	8,2	1834	55,1	1,86
NMPC	3	100	300	2,1	0,6	32	2	2,8	30	100	50	1500	50	4,5
Region clarke	0,16**	51*	52*	0,018**	0,3**	10*	5,2**	–	5,0**	20*	17*	735*	26*	0,23**

NMPC - norms of the maximum permissible concentration, milligrams per kilogram based on a research background (clarke) (approved by the resolution of the Cabinet of Ministers of Ukraine dated December 15, 2021 No. 1325).

** - Regional claeke of heavy metals for the substantiation of Ukraine, mg/kg (according to A.I. Fateev).*

*** - Regional geochemical studies of the soils of Ukraine within the framework of the international project (GEMAS) (author V.R. Klos).*

Laboratory Data
Location - 6

Prime Lab Tech

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National Accreditation Agency of Ukraine
№201741
ДСТУ EN ISO/IEC 17025

Certificate of Analysis №2388-1
January 22, 2024

Customer: "TEREZINE" LLC
Location: Ukraine, Kyiv region, Bila Tserkva district
Location information using GPS: 49.84034, 30.08588
E-mail: moroz.oleksandr94@ukr.net
Sample: Soil at a distance of 500 meters

Date of selection: 12.01.2024
Sample condition: appropriate
Delivery date: 12.01.2024
Analysis period: 12.01.2024 - 22.01.2024

Test results

Sample	Indicator name, unit of measurement												
	N (NH_4) mg/kg	N (NO_3) mg/kg	Ph hydrolitic mmol/100g	Ph exchangeable	Mass fraction of carbon, %	S, mg/kg	P_2O_5 mg/kg	K_2O mg/kg	Ca, mg/kg	Mg, mg/kg	Na, mg/kg	Sum of absorbed bases, mmol/100 g	Electrical conductivity, mSm/m
Soil	7,1	3,1	2,81	5,4	1,7	2,1	200,9	104,0	2500,0	227,8	70,0	22,8	5,23

Prime Lab Tech

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Test results

Name of tests and characteristics to be determined	*Soil at near the impact point of the bomb/explosion point*	*Soil at a distance of 50 meters*	*Soil at a distance of 100 meters*	*Soil at a distance of 200 meters*	*Soil at a distance of 500 meters*	*Uncertainty of measurement*
Clay 0,002 mm, %	5,9	6,4	6,9	7,3	7,5	+/- 0,7
Silt 0,05-0,002 mm, %	21,8	22,2	22,4	22,6	22,7	+/- 1,0
Sand 2-0,05 mm, %	72,3	71,4	70,7	70,1	69,8	+/- 1,6
Humus content, %	2,42	2,74	3,00	3,15	3,20	-

Expanded uncertainty of measurement is the actual value expressed in units of the measurement value, obtained by multiplying the standard uncertainties by the coverage factor k=2, which provides a normal distribution of uncertainty and approximately corresponds to 95% probability of coverage, calculated according to the requirements of the Service Customer.

Methods of determination:

DSTU 4405:2005, DSTU 4115-2002, DSTU 4114-2002 Soil quality. Determination of mobile compounds of phosphorus and potassium.
WREP-125, 3rd Edition, 2005 – Soil, plant and water reference methods for the Western Region S-14.10 – Partical size anlysis. Hydrometer Method.

Notes:

1. *The results of the determinations are presented in terms of the air-dry state of the soil.*
2. *The test results apply only to those samples that have been submitted for testing and indicated in the input data of the test report.*
3. *Withoutthe original signature, the test report is considered invalid.*
4. *Reproduction of the test report is partially or completely impossible without the written permission of the laboratory.*

Approved:
General director of the Laboratory of Prime Lab Tech LLC: _____ **L.V. Vasylenko**
Signature

End of protocol

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№201741
ДСТУ EN ISO/IEC 17025

Test results

Sample	*Name of tests and characteristics to be determined,*														
	Cd, mg/kg	***Cr, mg/kg***	***Zn, mg/kg***	***Hg, mg/kg***	***Se, mg/kg***	***Pb, mg/kg***	***As, mg/kg***	***F, mg/kg***	***B, mg/kg***	***Cu, mg/kg***	***Co, mg/kg***	***Mn, mg/kg***	***Ni, mg/kg***	***Sb, mg/kg***	***Mo, mg/kg***
Soil at near the impact point of the bomb/explosion point	4,8	106,4	521,5	0,02	0,1	114,6	0,1	330,7	3,1	205,9	7,3	2054	61,8	0,1	0,1
Soil at a distance of 50 meters	3,5	95,6	409,4	0,02	0,1	103,2	0,1	335,4	8,3	169,4	7,5	1654	56,9	0,1	0,1
Soil at a distance of 100 meters	2,3	82,4	274,5	0,02	0,1	87,9	0,1	347,5	8,5	126,5	10,8	1221	46,8	0,1	0,1
Soil at a distance of 200 meters	0,7	64,5	157,5	0,02	0,1	56,4	0,1	350,4	8,5	79,4	10,9	759	34,5	0,1	0,1
Soil at a distance of 500 meters	0,4	48,3	103,4	0,02	0,1	37,5	0,1	343,2	8,7	39,8	11,2	545	22,9	0,1	0,1
NMPC	***3***	***100***	***300***	***2,1***	***0,6***	***32***	***2***	***–***	***30***	***100***	***50***	***1500***	***50***	***4,5***	***–***
Region clarke	***0,16*****	***85****	***62****	***0,02*****	***0,3*****	***13****	***5,2*****	***250*****	***5,0*****	***27****	***16****	***670****	***25****	***0,23*****	***0,36*****

NMPC - norms of the maximum permissible concentration, milligrams per kilogram based on a research background (clarke) (approved by the resolution of the Cabinet of Ministers of Ukraine dated December 15, 2021 No. 1325).

** - Regional clarke of heavy metals for the substantiation of Ukraine, mg/kg (according to A.I. Fateev).*

*** - Regional geochemical studies of the soils of Ukraine within the framework of the international project (GEMAS) (author V.R. Klos).*

Laboratory Data
Location - 7

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№201741
ДСТУ EN ISO/IEC 17025

Certificate of Analysis №2777-1
February 12, 2024

Customer: "Kovbasa V.O." Farm
Location: Ukraine, Chernihiv region, Mena district
Location information using GPS: 51.614842, 31.70313
E-mail: agrouk7@ukr.net
Sample: Soil at a distance of 500 meters

Date of selection: 01.02.2024
Sample condition: appropriate
Delivery date: 03.02.2024
Analysis period: 03.02.2024 - 12.02.2024

Test results

Sample	Indicator name, unit of measurement												
	N (NH_4) mg/kg	N (NO_3) mg/kg	Ph hydrolitic mmol/100g	Ph exchangeable	Mass fraction of carbon, %	S, mg/kg	P_2O_5 mg/kg	K_2O mg/kg	Ca, mg/kg	Mg, mg/kg	Na, mg/kg	Sum of absorbed bases, mmol/100 g	Electrical conductivity, mSm/m
Soil	6,5	16,6	< 0,23	7,7	2,5	4,3	16,2	107,25	2025,0	865,7	56,3	20,0	14,18

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Test results

Name of tests and characteristics to be determined	*Soil at near the impact point of the bomb/explosion point*	*Soil at a distance of 50 meters*	*Soil at a distance of 100 meters*	*Soil at a distance of 200 meters*	*Soil at a distance of 500 meters*	*Uncertainty of measurement*
Clay 0,002 mm, %	6,3	6,9	7,4	8,2	8,3	+/- 0,5
Silt 0,05-0,002 mm, %	29,9	30,7	30,8	31,1	31,4	+/- 1,0
Sand 2-0,05 mm, %	63,8	62,4	61,8	60,7	60,3	+/- 1,2
Humus content, %	3,3	3,6	3,9	4,1	4,7	-

Expanded uncertainty of measurement is the actual value expressed in units of the measurement value, obtained by multiplying the standard uncertainties by the coverage factor k=2, which provides a normal distribution of uncertainty and approximately corresponds to 95% probability of coverage, calculated according to the requirements of the Service Customer.

Methods of determination:

DSTU 4405:2005, DSTU 4115-2002, DSTU 4114-2002 Soil quality. Determination of mobile compounds of phosphorus and potassium.
WREP-125, 3rd Edition, 2005 – Soil, plant and water reference methods for the Western Region S-14.10 – Partical size anlysis. Hydrometer Method..

Notes:

1. *The results of the determinations are presented in terms of the air-dry state of the soil.*
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Approved:
General director of the Laboratory of Prime Lab Tech LLC: _____ **L.V. Vasylenko**
Signature

End of protocol

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National Accreditation Agency of Ukraine
№201741
ДСТУ EN ISO/IEC 17025

Test results

Sample	*Name of tests and characteristics to be determined,*														
	Cd, mg/kg	***Cr, mg/kg***	***Zn, mg/kg***	***Hg, mg/kg***	***Se, mg/kg***	***Pb, mg/kg***	***As, mg/kg***	***F, mg/kg***	***B, mg/kg***	***Cu, mg/kg***	***Co, mg/kg***	***Mn, mg/kg***	***Ni, mg/kg***	***Sb, mg/kg***	***Mo, mg/kg***
Soil at near the impact point of the bomb/explosion point	2,1	87,8	270,9	<0,02	<0,1	70,3	0,21	119,4	2,4	91,3	9,5	976	49,8	<0,1	0,22
Soil at a distance of 50 meters	1,8	78,4	239,8	<0,02	<0,1	59,4	0,18	117,6	2,6	68,3	9,3	857	33,8	<0,1	0,26
Soil at a distance of 100 meters	1,3	67,3	175,6	<0,02	<0,1	42,5	0,11	101,8	2,9	51,6	9	713	20,9	<0,1	0,31
Soil at a distance of 200 meters	0,7	46,9	86,9	<0,02	<0,1	26,2	0,11	98,6	2,9	38,9	8,6	587	16,3	<0,1	0,31
Soil at a distance of 500 meters	0,2	25,4	49,7	<0,02	<0,1	16,7	0,1	95,6	3,1	11,4	8,8	423	14,6	<0,1	0,32
NMPC	**3**	**100**	**300**	**2,1**	**0,6**	**32**	**2**	**–**	**30**	**100**	**50**	**1500**	**50**	**4,5**	-
Region clarke	**0,16****	**39***	**42***	**0,018****	**0,3****	**11,4***	**5,2****	***250*****	**5,0****	**8***	**10***	**395***	**12***	**0,23****	**0,36****

NMPC - norms of the maximum permissible concentration, milligrams per kilogram based on a research background (clarke) (approved by the resolution of the Cabinet of Ministers of Ukraine dated December 15, 2021 No. 1325).

** - Regional clarke of heavy metals for the substantiation of Ukraine, mg/kg (according to A.I. Fateev).*

*** - Regional geochemical studies of the soils of Ukraine within the framework of the international project (GEMAS) (author V.R. Klos).*

Laboratory Data
Location - 8

Prime Lab Tech

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№201741
ДСТУ EN ISO/IEC 17025

Certificate of Analysis №2402-1
February 12, 2024

Customer: **"AGRARIAN COMPANY "NIVA-PLUS" LLC**
Location: Ukraine, Chernihiv region, Ichnya district
Location information using GPS: 50.76585, 32.67614
E-mail: Matveevniva@ukr.net
Sample: Soil at a distance of 500 meters

Date of selection: 02.02.2024
Sample condition: appropriate
Delivery date: 03.02.2024
Analysis period: 03.02.2024 - 12.02.2024

Test results

Sample	Indicator name, unit of measurement												
	N (NH_4) mg/kg	N (NO_3) mg/kg	Ph hydrolitic mmol/100g	Ph exchangeable	Mass fraction of carbon, %	S, mg/kg	P_2O_5 mg/kg	K_2O mg/kg	Ca, mg/kg	Mg, mg/kg	Na, mg/kg	Sum of absorbed bases, mmol/100 g	Electrical conductivity, mSm/m
Soil	38,4	37,0	< 0,23	7,6	2,0	1,2	33,2	222,2	2200,0	212,6	16,4	13,0	18,51

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Annex 3.4.1

Prime Lab Tech

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№201741
ДСТУ EN ISO/IEC 17025

Test results

Name of tests and characteristics to be determined	*Soil at near the impact point of the bomb/explosion point*	*Soil at a distance of 50 meters*	*Soil at a distance of 100 meters*	*Soil at a distance of 200 meters*	*Soil at a distance of 500 meters*	*Uncertainty of measurement*
Clay 0,002 mm, %	9,6	9,5	10,7	11,2	11,6	+/- 1,0
Silt 0,05-0,002 mm, %	27,5	27,9	28,2	28,2	28,3	+/- 0,8
Sand 2-0,05 mm, %	62,9	62,6	61,1	60,6	60,1	+/- 1,1
Humus content, %	2,6	2,8	3,6	3,6	3,8	-

Expanded uncertainty of measurement is the actual value expressed in units of the measurement value, obtained by multiplying the standard uncertainties by the coverage factor k=2, which provides a normal distribution of uncertainty and approximately corresponds to 95% probability of coverage, calculated according to the requirements of the Service Customer.

Methods of determination:

DSTU 4405:2005, DSTU 4115-2002, DSTU 4114-2002 Soil quality. Determination of mobile compounds of phosphorus and potassium.
WREP-125, 3rd Edition, 2005 – Soil, plant and water reference methods for the Western Region S-14.10 – Partical size anlysis. Hydrometer Method..

Notes:

1. *The results of the determinations are presented in terms of the air-dry state of the soil.*
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3. *Withoutthe original signature, the test report is considered invalid.*
4. *Reproduction of the test report is partially or completely impossible without the written permission of the laboratory.*

Approved:
General director of the Laboratory of Prime Lab Tech LLC: _____ **L.V. Vasylenko**
Signature
End of protocol

Prime Lab Tech

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№201741
ДСТУ EN ISO/IEC 17025

Test results

Sample	*Name of tests and characteristics to be determined,*														
	Cd, mg/kg	***Cr, mg/kg***	***Zn, mg/kg***	***Hg, mg/kg***	***Se, mg/kg***	***Pb, mg/kg***	***As, mg/kg***	***F, mg/kg***	***B, mg/kg***	***Cu, mg/kg***	***Co, mg/kg***	***Mn, mg/kg***	***Ni, mg/kg***	***Sb, mg/kg***	***Mo, mg/kg***
Soil at near the impact point of the bomb/explosion point	2,3	95,4	311,5	<0,02	<0,1	86,5	<0,1	312,6	3,4	109,6	14,7	1096	39,8	<0,1	0,21
Soil at a distance of 50 meters	2	98,5	252,6	<0,02	<0,1	72,8	<0,1	308,7	3,6	87,6	14,2	953	27,6	<0,1	0,23
Soil at a distance of 100 meters	1,4	66,9	187,4	<0,02	<0,1	63,4	<0,1	306,2	3,8	65,2	13,9	774	18,4	<0,1	0,25
Soil at a distance of 200 meters	0,8	51,3	92,5	<0,02	<0,1	46,8	<0,1	305,4	3,8	35,9	13,5	601	14,3	<0,1	0,26
Soil at a distance of 500 meters	0,3	28,4	51,3	<0,02	<0,1	21,6	<0,1	301,3	3,9	14,3	9,6	521	10,5	<0,1	0,25
NMPC	***3***	***100***	***300***	***2,1***	***0,6***	***32***	***2***	–	***30***	***100***	***50***	***1500***	***50***	***4,5***	–
Region clarke	***0,16*****	***39****	***42****	***0,018*****	***0,3*****	***11,4****	***5,2*****	***250*****	***5,0*****	***8****	***10****	***395****	***12****	***0,23*****	***0,36***

NMPC - norms of the maximum permissible concentration, milligrams per kilogram based on a research background (clarke) (approved by the resolution of the Cabinet of Ministers of Ukraine dated December 15, 2021 No. 1325).

** - Regional clarke of heavy metals for the substantiation of Ukraine, mg/kg (according to A.I. Fateev).*

*** - Regional geochemical studies of the soils of Ukraine within the framework of the international project (GEMAS) (author V.R. Klos).*

Laboratory Data
Location - 9

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Certificate of Analysis №2873-1
January 26, 2024

Customer: "AgroSoyuz" Farm
Location: Ukraine, Zhytomyr region, Zvyagel district
Location information using GPS: 50.44037, 27.456526
E-mail: t.pozniak@ukr.net
Sample: Soil at a distance of 500 meters

Date of selection: 18.01.2024
Sample condition: appropriate
Delivery date: 19.01.2024
Analysis period: 19.01.2024 - 26.01.2024

Test results

Sample	Indicator name, unit of measurement												
	N (NH_4) mg/kg	N (NO_3) mg/kg	Ph hydrolitic mmol/100g	Ph exchangeable	Mass fraction of carbon, %	S, mg/kg	P_2O_5 mg/kg	K_2O mg/kg	Ca, mg/kg	Mg, mg/kg	Na, mg/kg	Sum of absorbed bases, mmol/100 g	Electrical conductivity, mSm/m
Soil	21,6	6,9	1,23	6,1	1,7	5,2	150,0	77,1	1783,3	212,6	33,5	7,5	8,75

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Annex 3.4.1

Prime Lab Tech

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№201741
ДСТУ EN ISO/IEC 17025

Test results

Name of tests and characteristics to be determined	*Soil at near the impact point of the bomb/explosion point*	*Soil at a distance of 50 meters*	*Soil at a distance of 100 meters*	*Soil at a distance of 200 meters*	*Soil at a distance of 500 meters*	*Uncertainty of measurement*
Clay 0,002 mm, %	11,9	12,1	12,3	12,9	12,8	+/- 1,1
Silt 0,05-0,002 mm, %	42,4	41,9	41,1	40,6	40,9	+/- 1,0
Sand 2-0,05 mm, %	45,8	46,0	46,6	46,5	46,3	+/- 1,4
Humus content, %	1,3	1,4	1,5	1,7	1,7	-

Expanded uncertainty of measurement is the actual value expressed in units of the measurement value, obtained by multiplying the standard uncertainties by the coverage factor k=2, which provides a normal distribution of uncertainty and approximately corresponds to 95% probability of coverage, calculated according to the requirements of the Service Customer.

Methods of determination:

DSTU 4405:2005, DSTU 4115-2002, DSTU 4114-2002 Soil quality. Determination of mobile compounds of phosphorus and potassium.
WREP-125, 3rd Edition, 2005 – Soil, plant and water reference methods for the Western Region S-14.10 – Partical size anlysis. Hydrometer Method.

Notes:

1. *The results of the determinations are presented in terms of the air-dry state of the soil.*
2. *The test results apply only to those samples that have been submitted for testing and indicated in the input data of the test report.*
3. *Withoutthe original signature, the test report is considered invalid.*
4. *Reproduction of the test report is partially or completely impossible without the written permission of the laboratory.*

Approved:
General director of the Laboratory of Prime Lab Tech LLC: _____ **L.V. Vasylenko**
Signature

End of protocol

Prime Lab Tech

Laboratory location:
115-V, Kyivskyi Shliakh str.,
village Velyka Oleksandrivka,
Boryspil district Kyiv region
Ukraine

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ilac-MRA
Національне агентство з акредитації України
National Accreditation Agency of Ukraine
№201741
ДСТУ EN ISO/IEC 17025

Test results

Sample	*Name of tests and characteristics to be determined,*														
	Cd, mg/kg	***Cr, mg/kg***	***Zn, mg/kg***	***Hg, mg/kg***	***Se, mg/kg***	***Pb, mg/kg***	***As, mg/kg***	***F, mg/kg***	***B, mg/kg***	***Cu, mg/kg***	***Co, mg/kg***	***Mn, mg/kg***	***Ni, mg/kg***	***Sb, mg/kg***	***Mo, mg/kg***
Soil at near the impact point of the bomb/explosion point	6,3	145,2	532,6	0,02	0,14	163,9	0,19	296,4	7,9	287,5	11,3	2743	64,5	0,14	0,18
Soil at a distance of 50 meters	4,7	124,7	397,4	0,02	0,14	132,5	0,19	305,9	8,3	156,8	11,7	1870	52,8	0,14	0,18
Soil at a distance of 100 meters	2,1	76,8	251,2	0,02	0,14	119,7	0,15	319,7	8,5	132,1	12,2	1398	43,6	0,11	0,22
Soil at a distance of 200 meters	0,9	64,9	106,9	0,02	0,13	68,6	0,16	320,9	8,5	98,7	12,1	1224	40,4	0,11	0,24
Soil at a distance of 500 meters	0,5	52,4	84,5	0,02	0,13	40,2	0,15	324,3	8,7	71,3	11,9	1109	37,2	0,09	0,25
NMPC	***3***	***100***	***300***	***2,1***	***0,6***	***32***	***2***	**–**	***30***	***100***	***50***	***1500***	***50***	***4,5***	–
Region clarke	***0,16*****	***85****	***62****	***0,02*****	***0,3*****	***13****	***5,2*****	***250*****	***5,0*****	***27****	***16****	***670****	***25****	***0,23*****	***0,36*****

NMPC - norms of the maximum permissible concentration, milligrams per kilogram based on a research background (clarke) (approved by the resolution of the Cabinet of Ministers of Ukraine dated December 15, 2021 No. 1325).

** - Regional clarke of heavy metals for the substantiation of Ukraine, mg/kg (according to A.I. Fateev).*

*** - Regional geochemical studies of the soils of Ukraine within the framework of the international project (GEMAS) (author V.R. Klos).*

Laboratory Data
Location - 10

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ДСТУ EN ISO/IEC 17025

Certificate of Analysis №2501-1
January 26, 2024

Customer: "ALLIANCE BECON" LLAC.
Location: Ukraine, Zhytomyr region, Baranivka district
Location information using GPS: 50.41868, 27.29883
E-mail: c.alliance@gmail.com
Sample: Soil at a distance of 500 meters

Date of selection: 17.01.2024
Sample condition: appropriate
Delivery date: 19.01.2024
Analysis period: 19.01.2024 - 26.01.2024

Test results

Sample	Indicator name, unit of measurement												
	N (NH_4) mg/kg	N (NO_3) mg/kg	Ph hydrolitic mmol/100g	Ph exchangeable	Mass fraction of carbon, %	S, mg/kg	P_2O_5 mg/kg	K_2O mg/kg	Ca, mg/kg	Mg, mg/kg	Na, mg/kg	Sum of absorbed bases, mmol/100 g	Electrical conductivity, mSm/m
Soil	20,5	13,8	0,61	7,3	2,1	6,6	45,5	69,7	3433,3	486,0	33,0	22,7	10,77

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Test results

Name of tests and characteristics to be determined	*Soil at near the impact point of the bomb/explosion point*	*Soil at a distance of 50 meters*	*Soil at a distance of 100 meters*	*Soil at a distance of 200 meters*	*Soil at a distance of 500 meters*	*Uncertainty of measurement*
Clay 0,002 mm, %	12,1	12,1	12,5	12,7	12,8	+/- 1,1
Silt 0,05-0,002 mm, %	39,7	39,3	38,5	38,6	38,3	+/- 1,0
Sand 2-0,05 mm, %	48,2	48,6	49,0	48,7	48,9	+/- 1,4
Humus content, %	1,7	1,8	2,0	2,0	2,1	-

Expanded uncertainty of measurement is the actual value expressed in units of the measurement value, obtained by multiplying the standard uncertainties by the coverage factor k=2, which provides a normal distribution of uncertainty and approximately corresponds to 95% probability of coverage, calculated according to the requirements of the Service Customer.

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DSTU 4405:2005, DSTU 4115-2002, DSTU 4114-2002 Soil quality. Determination of mobile compounds of phosphorus and potassium.

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Approved:

General director of the Laboratory of Prime Lab Tech LLC: _____ **L.V. Vasylenko**

Signature

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Test results

Sample	*Name of tests and characteristics to be determined,*														
	Cd, mg/kg	***Cr, mg/kg***	***Zn, mg/kg***	***Hg, mg/kg***	***Se, mg/kg***	***Pb, mg/kg***	***As, mg/kg***	***F, mg/kg***	***B, mg/kg***	***Cu, mg/kg***	***Co, mg/kg***	***Mn, mg/kg***	***Ni, mg/kg***	***Sb, mg/kg***	***Mo, mg/kg***
Soil at near the impact point of the bomb/explosion point	8,2	166,3	467,6	0,02	0,19	187,4	0,14	216,8	4,4	241,3	17,5	2153	58,7	0,33	0,49
Soil at a distance of 50 meters	3,6	134,1	416,8	0,02	0,21	152,1	0,14	223,7	4,4	176,8	17,4	1852	55,4	0,31	0,50
Soil at a distance of 100 meters	1,9	89,5	301,5	0,02	0,23	126,3	0,13	220,5	4,2	125,3	17,5	1512	46,5	0,31	0,52
Soil at a distance of 200 meters	1,1	63,9	138,4	0,02	0,23	91,5	0,13	218,4	4,0	106,8	17,7	1324	38,7	0,27	0,52
Soil at a distance of 500 meters	0,87	45,7	95,2	0,02	0,25	46,2	0,11	212,8	3,7	52,9	17,9	956	34,1	0,21	0,54
NMPC	***3***	***100***	***300***	***2,1***	***0,6***	***32***	***2***	–	***30***	***100***	***50***	***1500***	***50***	***4,5***	–
Region clarke	***0,16*****	***85****	***62****	***0,02*****	***0,3*****	***13****	***5,2*****	***250*****	***5,0*****	***27****	***16****	***670****	***25****	***0,23*****	***0,36*****

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