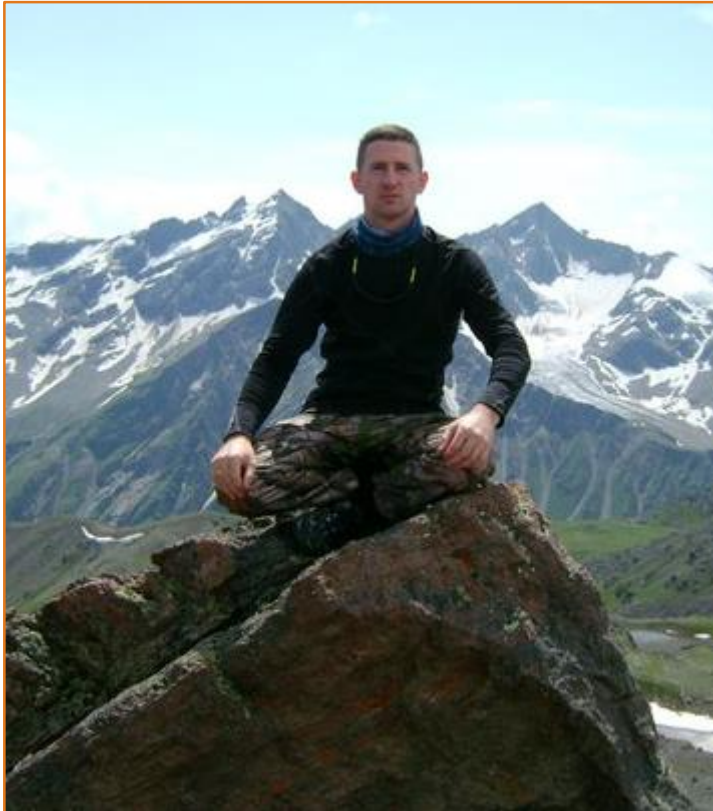




International practices in agricultural spraying and fertilizer spreading



Our speaker



VITALII TURLENKO

- Head of Development Pegasus-Agro in North America;
- CEO of RIC-AGRO (Dealer network of self-propelled sprayers Tuman in the Republic of Bashkortostan);
- Farmer

Program of webinar «International practices in agricultural spraying and fertilizer spreading»

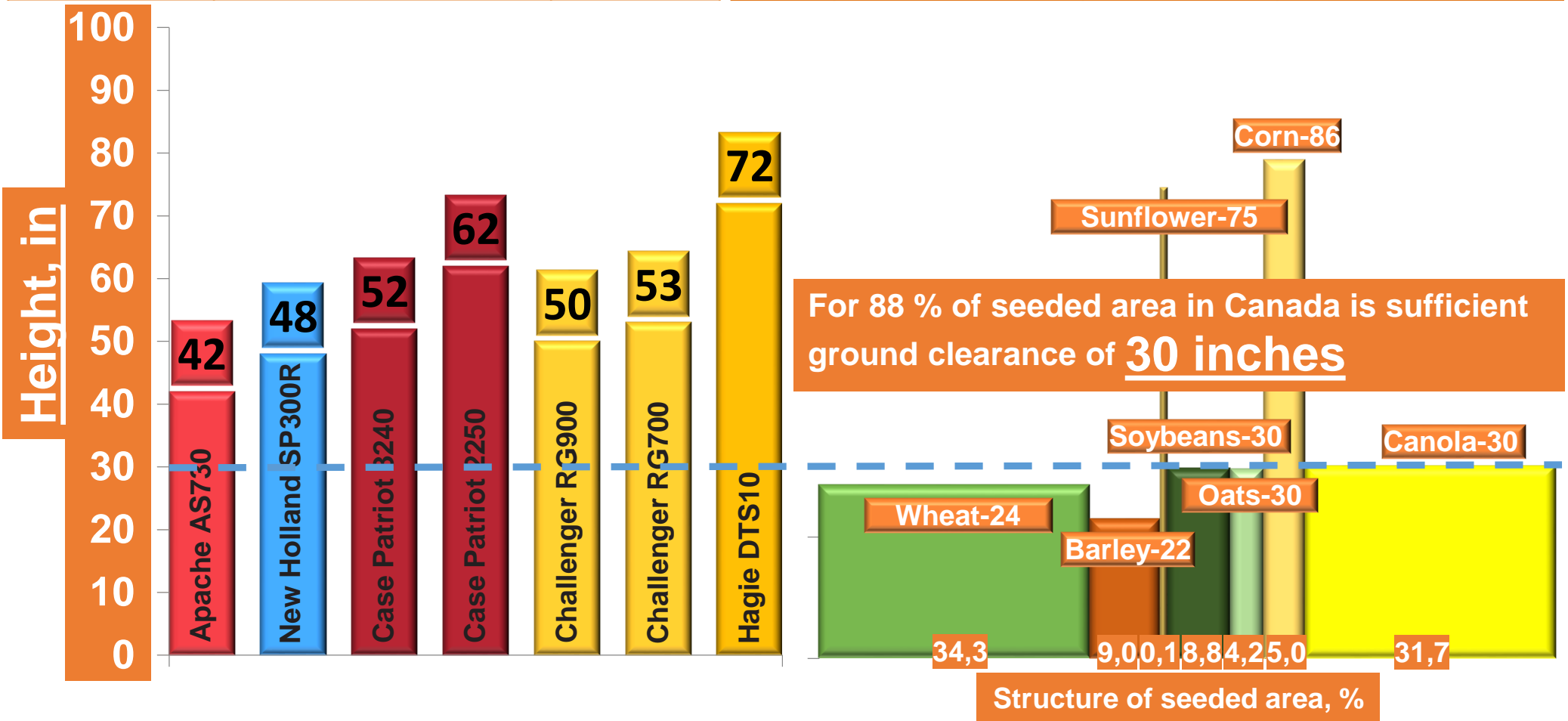
1. Problems with spraying and spreading in agriculture;
2. Case studies of solving problems when applying fertilizer and spraying
3. Tuman sprayer development in Canada.

Excessive clearance and the use of ineffective parts with heavy weight



Overweight of self-propelled sprayers and spreaders

MODEL	Weight LBS / KG	Clearance in / cm	Type of crop	Seeded area in Canada, 2018, acres	Structure of seeded area, %	Usual plant height in the last spraying, in / cm
Hagie DTS10	20,200 / 9 160	72 / 182,9	Wheat	24 734 500	34,3	27 / 70
Challenger RG700	19,500 / 8 850	53 / 136,0	Barley	6 493 200	9,0	22 / 56
Challenger RG900	29,500 / 13 380	50 / 127,0	Sunflower	70 700	0,1	75 / 190
Case Patriot 2250	21,030 / 9 540	62 / 158,0	Soybeans	6 320 100	8,8	30 / 75
Case Patriot 3240	23,480 / 10 650	52 / 132,0	Oats	3 052 600	4,2	30 / 75
New Holland SP300R	30,900 / 14 016	48 / 121,9	Corn	3 626 500	5,0	86 / 220
Apache AS730	19,700 / 8 940	42 / 106,7	Canola	22 813 200	31,7	30 / 75



Soil compaction



Plow sole



Soil destruction



Working in bad weather



High position of spreader



Using different machines for different application operations



Ways to solve problems in spreading and spraying

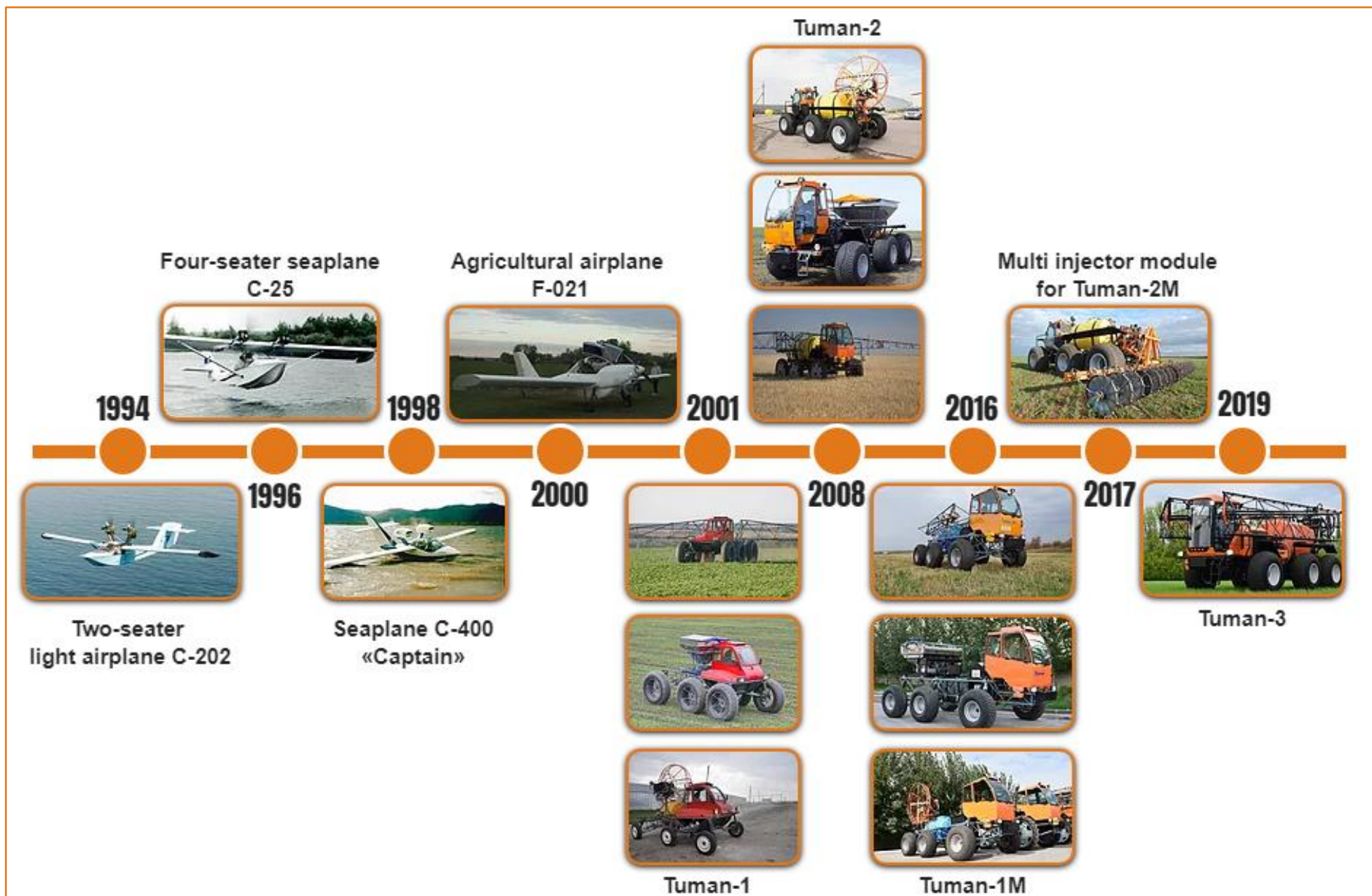
- 1) Creating a sprayers with optimal clearance;
- 2) Optimize frame design;
- 3) Reduce weight;
- 4) Achieve high power to weight ratio;
- 5) Reduce fuel consumption;
- 6) Using a triaxle arrangement;
- 7) Reduce the height of the point of spreading;
- 8) Possibility of using flotation wheels;
- 9) Reduce ground pressure;
- 10) Possibility of use in bad weather = passability;
- 11) Modularity and versatility;
- 12) Affordability;
- 13) Other problems (You can tell us about it right now or in end of webinar).

Agriculture in Canada and Russia

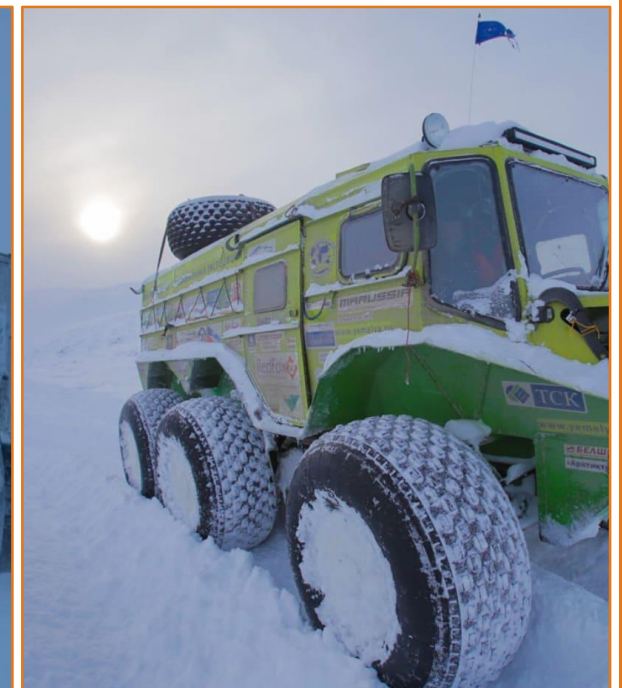
Type of crop	Seeded area in 2018, acres		Structure of seeded area, %	
	Canada	Russia	Canada	Russia
Wheat	24 734 500	67 370 917	34,3	34,2
Barley	6 493 200	20 571 800	9,0	10,5
Sunflower	70 700	20 164 005	0,1	10,2
Soybeans	6 320 100	7 287 524	8,8	3,7
Oats	3 052 600	7 050 630	4,2	3,6
Corn	3 626 500	6 059 027	5,0	3,1
Canola	22 813 200	3 427 005	31,7	1,7
Other	4 926 900	64 848 042	6,8	33,0



Tuman sprayers history



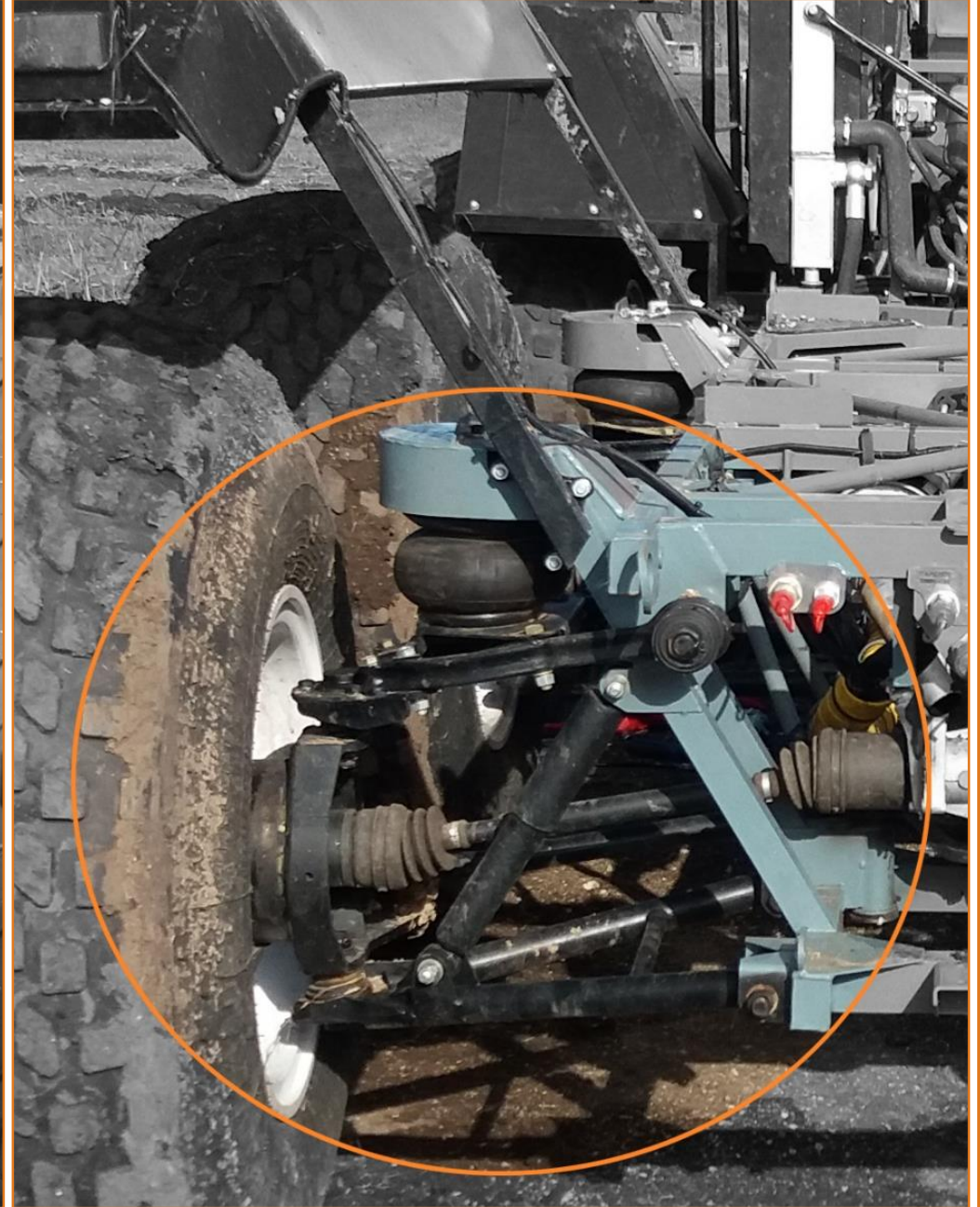
Tuman – like Arctic all-terrain vehicle



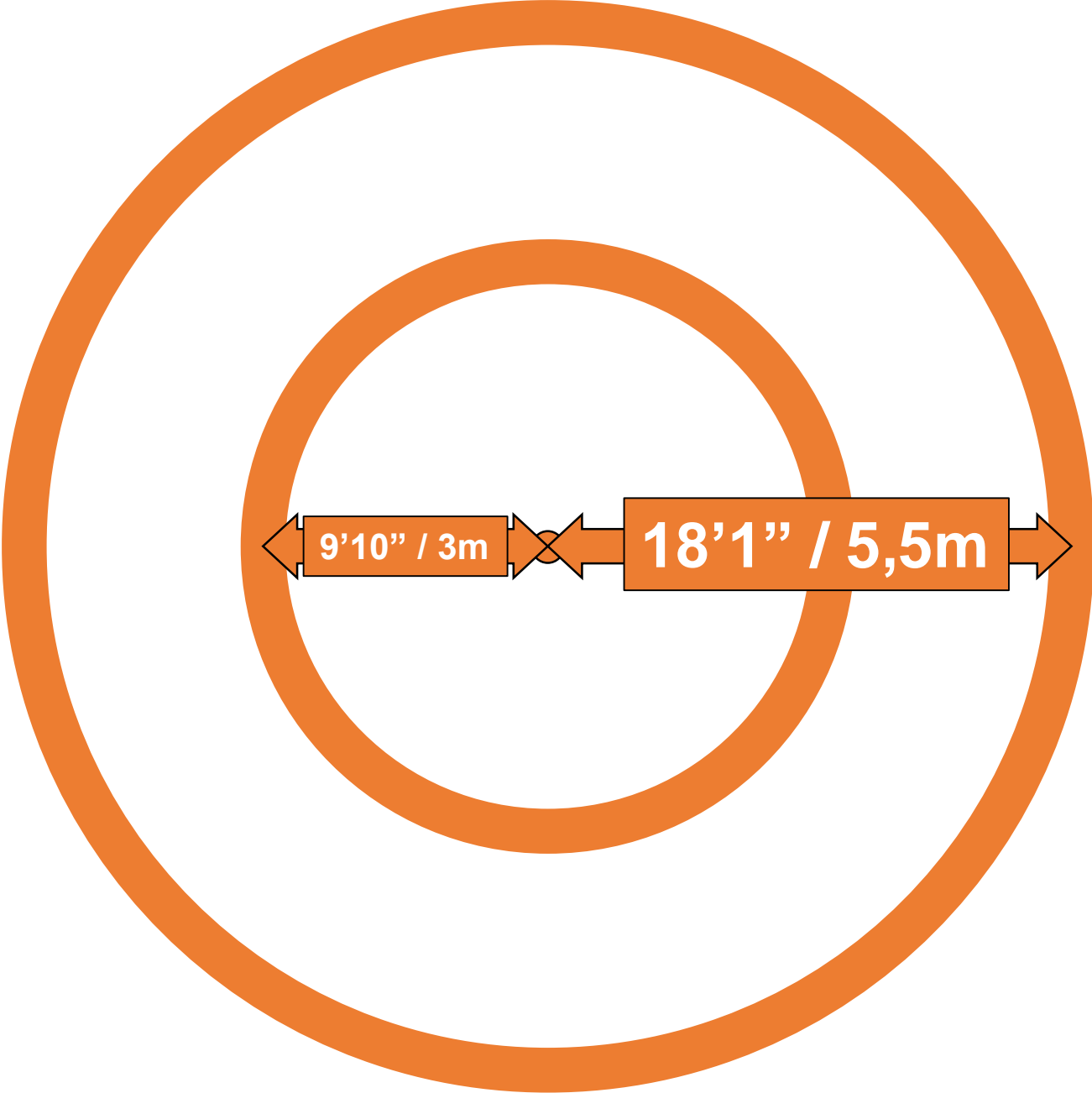
Clearance of Tuman sprayer 32 inch – optimal for most crops



Fully independent suspension



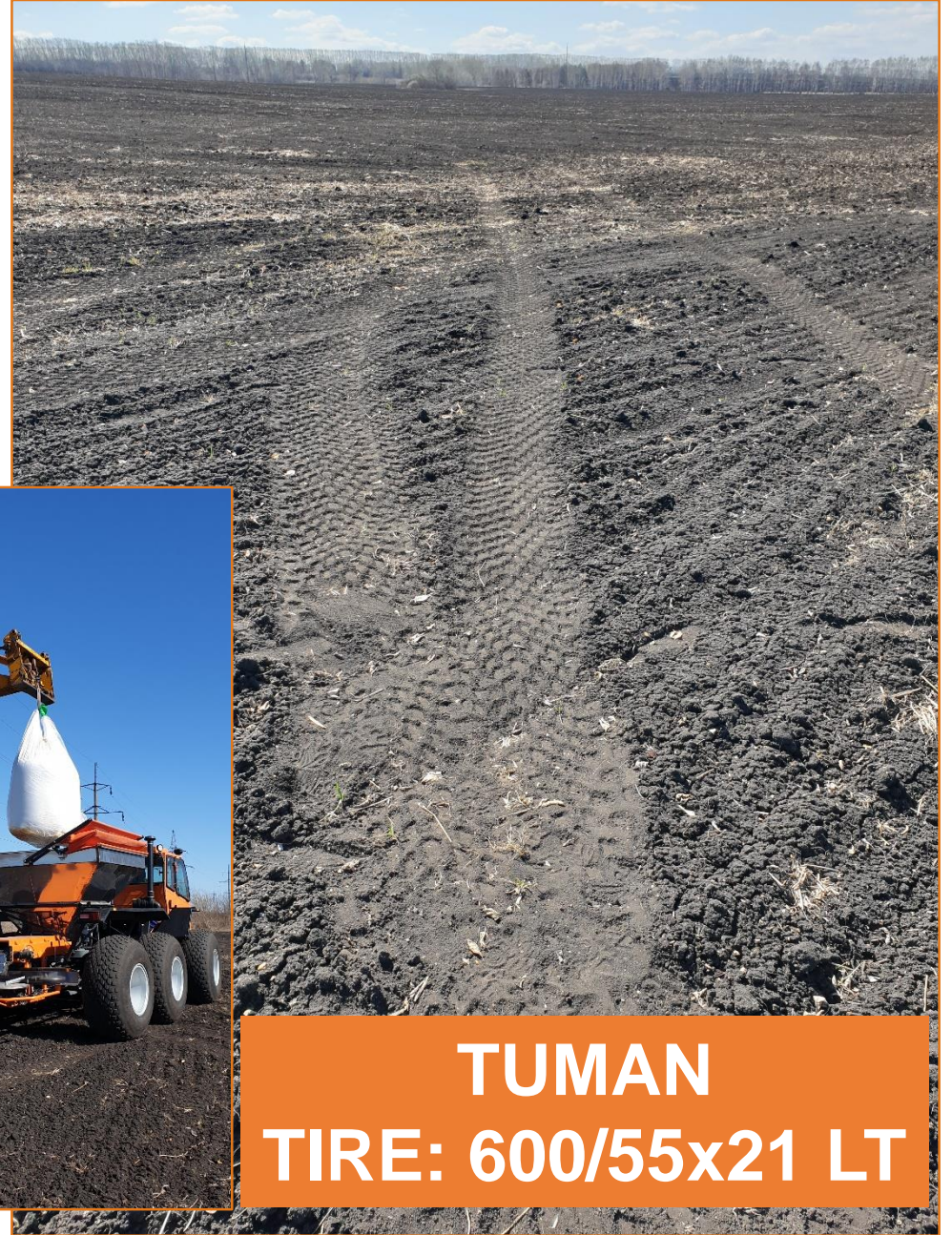
Turning radius



Space frame



Low ground pressure





Spring spreading on winter crops



Spring nitrogen injection on winter crops



Tuman-3 on different wheels



TUMAN 3
TIRE: 600/55x21 LT



TUMAN 3
TIRE: 9,5/90 R42
(W8-42)

Tuman modules



SPRAYER
(Wide flotation wheels)



SPRAYER
(Narrow wheels)



MULTI INJECTOR



FAN SPRAYER



SPREADER



SEEDER

SELF-PROPELLED SPRAYER TYMAN-3 SPECIFICATION

DIMENSIONS

LENGTH	275 in. (7000 mm)
WIDTH:	
Narrow wheels (240/90 R42)	94 in. (2400 mm)
Wide wheels (600-55x21 LT)	114 in. (2900 mm)
HEIGHT:	
Narrow wheels	126 in. (3200 mm)
Wide wheels	118 in. (3000 mm)
WHEEL TRACK ADJUSTMENT	78 3/4 in. / 84 2/3 in. / 88 1/2 in. / 90 in. (2000 mm / 2150 mm / 2250 mm / 2288 mm)
CLEARANCE (not less):	
Narrow wheels	20/32 in. (50/80 cm)
Wide wheels	15 in. (37 cm)
LATERAL ANGLE OF THE STATIC STABILITY	30
TURNING RADIUS (NOT MORE)	37 ft. 4 1/5 in. (12 m)
DRY WEIGHT	7,716 LBS (3500 KG)
GROUND PRESSURE:	
Narrow wheels	adjustment: 22,0-29,4 psi (1,5-2,0 at) recommended: 22,0 psi (1,5 at)
Wide wheels	adjustment: 5,8-11,8 psi (0,4-0,8 at) recommended: 5,8-8,8 psi (0,4-0,6 at)

ENGINE

MAKE	KUBOTA Turbo Diesel
POWER	115 hp (86 kW)
DISPLACEMENT	230 cu. in. (3.769 L)
FUEL TANK CAPACITY	21 gal. (80 L)
FUEL CONSUMPTION	26-93 acres per gallon (0,1-0,35 L/Ha)

DRIVETRAIN

TYPE	Mechanical drive
TRANSMISSION	Manual, five-speed with synchronizers on all gears
CLUTCH	Dry single-plate clutch with diaphragm spring and hydraulic drive
WHEEL FORMULA	6x4
AXLES	front steering axle / middle driven axle / rear driven steering axle
SUSPENSION	Independent, pneumatic
TIRES	240/90 R42 / 600-55x21 LT
BRAKE SYSTEM	Dual-circuit with hydraulic drive
BRAKE MECHANISMS	Disc, 12 in. (300 mm)
TOP ROAD SPEED	32 mph (52 km/h)



SPRAYER

CAPACITY	680 gal. (2 600 L)
TANK MATERIAL	Polyethylene
BOOM WIDTH	92-ft. (28 m)
BOOM ADJUSTMENT HEIGHT	20-83 in. (50-210 cm)
BOOM MATERIAL	Aluminum
BOOM LOCATION	Rear
BOOM SECTIONS	5; 7; 9; 11
PUMP	Piston Diaphragm, 8-75,3 gpm (30-285 L/min)
NUMBER OF NOZZLES	48; 56
NOZZLE SPACING	20 in.
COVERAGE PER HOUR	up to 200 acres per hour (80 Ha/hour)
TOP SPRAY SPEED	22 mph (35 km/h)

FAN SPRAYER

DIAMETER OF FAN	32 in. (185 cm)
NUMBER OF BLADES	4
RANGE OF SPRAYING	109-218 yd. (50-100 m) – in the calm
NUMBER OF NOZZLES	20
OPERATING PRESSURE	10 bar

SPREADER

CAPACITY	91,8 cu. ft. (2,6 cu. m)
SPREAD WIDTH	33-92 ft. (10-28 m)
TANK MATERIAL	Stainless steel
COVERAGE PER HOUR	up to 200 acres per hour (80 Ha/hour)
TOP SPREAD SPEED	22 mph (35 km/h)

MULTI INJECTOR

WIDTH	21 ft. (6,3 m)
NUMBER OF DISCS	18
NEEDLES PER DISC	12
TOP INJECTION SPEED	9 mph (15 km/h)

CONVERTING TIME – 4 HOURS

COMPARISON OF TUMAN-3 WITH OTHER SPRAYERS

MODEL	Weight LBS / KG	Tank capacity gal. / L	Weight / Tank capacity KG/L / LBS/gal.	Fuel consumption acres per gallon / L/Ha
Tuman 3	7,716 / 3 500	687 / 2 600	1,3 / 11,2	26-93 / 0,1-0,35
Hagie DTS10	20,200 / 9 160	1000 / 3 785	2,4 / 20,2	Less than 15 / More 0,6
Challenger RG700	19,500 / 8 850	700 / 2 650	3,3 / 27,9	
Challenger RG900	29,500 / 13 380	900 / 3 400	3,9 / 32,8	
Case Patriot 2250	21,030 / 9 540	660 / 2 500	3,7 / 35,1	
Case Patriot 3240	23,480 / 10 650	800 / 3 030	3,5 / 29,4	
New Holland SP300R	30,900 / 14 016	1000 / 3 785	3,7 / 30,9	
Apache AS730	19,700 / 8 940	750 / 2 840	3,1 / 19,7	

MODEL	Ground pressure PSI / AT	Power HP / kW	Power to weight ratio HP/t / kW/t	Sprayer	Spreader	Injection tools	Fan sprayer	Seeder
Tuman 3	5,8-29,4 / 0,4-2,0	115 / 86	32,9 / 24,6	●*	●	○	○	○
Hagie DTS10	16,2-44 / 1,1-3,0	225 / 167	24,6 / 18,1	●	○	○	X	X
Challenger RG700		173 / 127	19,35 / 14,3	●	X	X	X	X
Challenger RG900		280 / 209	20,9 / 15,4	●	●	X	X	X
Case Patriot 2250		175 / 131	18,3 / 13,7	●	X	○	X	X
Case Patriot 3240		250 / 187	23,5 / 17,5	●	X	○	X	X
New Holland SP300R		300 / 224	21,4 / 16,0	●	○	○	X	X
Apache AS730		173 / 127	19,4 / 14,3	●	X	X	X	X

● – standard; ○ - option.



The Economics of using Tuman sprayers

Tuman spraying services in Russia amount to 1.6 Canadian dollars per acre. At the same time, companies providing spraying services pay for machines in less than 2 seasons.



Evaluating Self-Propelled Sprayer Ownership with the OwnSprayer Spreadsheet

October, 2010 (available on website www.AgManager.info)

Kevin Dhuyvetter, K-State Ag. Economics (785.532.3527; kcd@ksu.edu)
 Rich Llewellyn, K-State Ag. Economics (785.532.1504; rll@ksu.edu)
 Terry Kastens, K-State Ag. Economics Emeritus

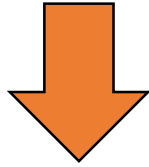
Sprayer class				1	Bank interest rate (percent)		5,00%
Sprayer age in years				0	Calculated after-tax discount rate		3,24%
Hours on sprayer				0	State + U.S. marginal income tax rate (percent)		20%
Purchase price of sprayer w/o trade-in				\$200 000	Self-employment tax (0 if corporation)		15,3%
Market price of sprayer				\$200 000	Section-179 deduction (\$500,000 max)		\$0
Cash downpayment				\$0	50% bonus 1st-yr dep. On new equip. (yes=1, no=0)		0
Calculated new equivalent price (NEP)				\$200 000	Calculated bonus yr-1 depreciation		\$0
					Calculated net \$ amount to depreciate		\$200 000
No. of seasons (years) before trade (max. 20)				3	1st year MACRS depreciation rate		14,29%
Sprayer boom width in feet				92	2nd year MACRS depreciation rate		24,49%
Sprayer travel speed in mph				15	3rd year MACRS depreciation rate		17,49%
Calculated acres per hour at 100% efficiency				167,27	4th year MACRS depreciation rate		12,49%
Average expected efficiency (percent)				40,00%	5th year MACRS depreciation rate		8,93%
Calculated acres per hour				66,91	6th year MACRS depreciation rate		8,92%
Total acres sprayed annually				20 000	7th year MACRS depreciation rate		8,93%
Calculated total hours accumulated annually				299	8th year MACRS depreciation rate		4,46%
					Calculated error check of depreciation rates		100,00%
					Calculated after-tax amortization factor		0,3551
					Calculated first-year after-tax discount factor		0,9687
					Tendering cost per hour		\$12,00
					Tendering cost per acre		\$1,20
					Calculated total tendering cost per acre		\$1,38
					Calculated after-tax NPVc from TT section		\$49 648
					Calculated after-tax amortized NPV from TT		\$17 631
					Calculated pre-tax amortized NPV from TT		\$27 251
					Prorated to opportunity interest		\$7 348
					Prorated to market depreciation		\$15 117
					Prorated to repairs		\$2 581
					Prorated to tax, insurance, & shelter (TIS)		\$2 204

	\$/year	\$/hour	\$/acre
Opportunity interest	\$7 348	\$24,58	\$0,37
Market depreciation	\$15 117	\$50,57	\$0,76
Repair and maintenance	\$2 581	\$8,64	\$0,13
Labor	\$5 605	\$18,75	\$0,28
Fuel and lubrication	\$7 196	\$24,08	\$0,36
Tax, insurance, & shelter (TIS)	\$2 204	\$7,37	\$0,11
Total for sprayer only	\$40 052	\$133,99	\$2,00
Tendering cost	\$27 587	\$92,29	\$1,38
Total for sprayer and tendering	\$67 639	\$226,28	\$3,38

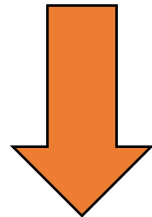
<http://www.agmanager.info/ksu-own-sprayer>

Plans to work in Canada

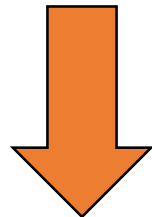
Certification for Canadian and USA requirements



Build a spare parts warehouse in Canada



Dealers



Consumers



Apimondia – Montréal, 8-12 September, 2019



Canada's Outdoor Park, Woodstock, Ontario, 10-11 September, 2019

Events



Kentucky Exposition Center,
937 Phillips Lane Louisville, Kentucky,
February, 2021



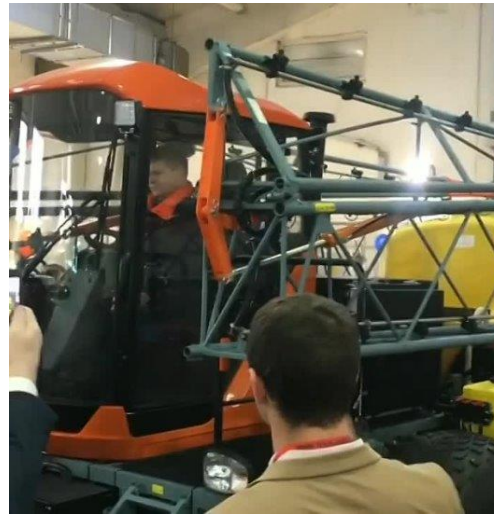
**FARM
PROGRESS
SHOW.**

Boone, Iowa,
September 1-3, 2020



Hannover, Germany,
November 10-16, 2019

Factory and Farm Tours



Our contacts

<https://pegas-agro.ru>

[https:// tumansprayer.com](https://tumansprayer.com) (started soon)

<https://www.instagram.com/tumansprayer/>

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(Konstantin Kimaev)